

U.S. MARINE CORPS TECHNICAL MANUAL

PRINCIPAL TECHNICAL CHARACTERISTICS OF U.S. MARINE CORPS MILITARY STANDARD AIR CONDITIONERS (ENVIRONMENTAL CONTROL UNITS (ECUs)) WITH SUPPLEMENTAL LOGISTIC DATA



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1. This Manual, authenticated for Marine Corps use and effective upon receipt, describes principal technical characteristics and supplemental logistics data for Military Standard Air Conditioners.
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SAFETY SUMMARY

The following **WARNINGS** and **CAUTIONS** appear on the page referenced and are listed here for emphasis.

WARNING

Do not attempt to operate the ECU until the specific technical manual has been reviewed to identify all safety concerns associated with this equipment. Failure to comply may result in damage to equipment or injury to personnel. (Page 4-1)

WARNING

Maintenance of the ECU cooling system requires silver soldering. Proper ventilation must be ensured to prevent harmful gas inhalation. Process requires torch emitting extreme heat. Take all necessary precautions to prevent severe injury to personnel. (Page 5-1)

WARNING

The ECU operates on very high voltage. Power source must be disconnected prior to performing service or maintenance on the unit. Failure to comply may result in severe injury or death to personnel. (Page 5-2)

WARNING

Do not use steam to clean the coils of the ECU. Use of steam may result in damage to equipment or severe injury to personnel. (Page 5-3)

CAUTION

Use Environmental Protection Agency (EPA) approved refrigerant/recycling station when servicing the equipment to preclude damage to equipment and the environment. (Page 5-4)

CAUTION

Use of water, especially high pressure hoses may result in damp or wet electrical components. Inspect and dry all electrical components, especially motor controllers prior to placing equipment in service. Failure to comply may result in damage to equipment. (Page 5-4)

CHAPTER 1

GENERAL INFORMATION

Section I. INTRODUCTION

1-1. PURPOSE.

To provide a ready reference of the principal technical characteristics of U.S. Marine Corps military standard air conditioners, hereafter referred to as Environmental Control Units (ECUs), with supplemental logistic data.

1-2. SCOPE

a. Horizontal ECUs. The horizontal, compact, lightweight ECUs included in this manual are listed below by Table of Authorized Materiel Control Number (TAMCN) and nominal cooling capacity:

- (1) B0001 (9,000 British Thermal Unit/Hour (BTU/HR))
- (2) B0002 (18,000 BTU/HR)
- (3) B0011 (54,000 BTU/HR)

b. Vertical ECUs. The vertical, compact, lightweight ECUs included in this manual are listed below by TAMCN and nominal cooling capacity:

- (1) B0003 (18,000 BTU/HR)
- (2) B0004 (18,000 BTU/HR)
- (3) B0005 (36,000 BTU/HR)
- (4) B0006 (36,000 BTU/HR)
- (5) B0007 (60,000 BTU/HR)
- (6) B0009 (9,000 BTU/HR)
- (7) B00012 (18,000 BTU/HR)
- (8) B0013 (36,000 BTU/HR)

c. Modification Instructions. Modification instructions to adapt standard ECUs to equipment presently using nonstandard or limited standard ECUs are referenced in table 1-1.

Table 1-1. Supported System (End Item) Modification

End Item TAMCN	Nomenclature	Modification Instruction
A0175	Calibration Complex, Transportable AN/TSM-119	MI-04294B-35/2
A2305	Sensor, Monitoring, Central AN/USQ-66(V)	MI-07754A-35/1
A2393	Signal Monitor Facility, Light AN/TSQ-88(V)	MI-04954A-35/4
A2540	Tactical Data Communication Central AN/TYQ-3A	MI-04429B-24/3
C5205	Lightweight Reproduction Facility Mar Div	MI-07561A-35/1

1-3. BACKGROUND. Due to the quantity of ECUs in the Marine Corps inventory, this manual has been developed to ease identification of the equipment and identify its general and specific capabilities. Nonstandard ECUs which are still in use will gradually be eliminated as older equipment becomes uneconomical to repair and will be replaced with one of the standard ECUs described in this manual.

1-4. MISSION EMPLOYMENT. U.S. Marine Corps military standard ECUs employed within the FMF are intended for use in cooling, heating, filtering, and dehumidifying to a desired predetermined range and circulating the conditioned air to provide cooling or heating of equipment. Recent engineering improvements have developed a family of rugged military standard ECUs featuring compactness and emphasizing efficiency and versatility. The new design incorporates electric motor-driven units utilizing a far more efficient power system than their gas engine prototypes. Their compact, lightweight characteristics provide payload versatility in both size and weight for military airlift deployment and installation.

Section II. DEMOLITION TO PREVENT ENEMY USE

1-5. GENERAL. When capture or abandonment of the ECU to an enemy is imminent, the responsible unit commander will decide either to destroy equipment or to render it inoperative. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all ECUs and all corresponding repair parts.

1-6. DEMOLITION TO RENDER THE ECU INOPERATIVE

a. Demolition by Mechanical Means. Use sledge hammers, crowbars, picks, axes, or any other heavy tool which may be available to destroy the following:

- (1) Evaporator coil
- (2) Condenser coil
- (3) Compressor
- (4) Thermostatic expansion valves
- (5) Fan motor
- (6) Control panel.

b. Misuse. Perform the following steps to render the ECU inoperative:

- (1) Pinch refrigerant tubing completely shut.
- (2) Break condenser fan blades.
- (3) Open suction line service valve. Open tubing and pour sand or other abrasive into refrigerant. Start and operate ECU until compressor fails.

1-7. DEMOLITION BY EXPLOSIVES OR WEAPONS FIRE

a. Explosives. Place as many of the following charges as situation permits and detonate them simultaneously with detonating cord and a suitable detonator.

- (1) Two 1/2-pound charges between compressor and control panel.
- (2) One 1/2-pound charge on condenser coil.
- (3) One 1/2-pound charge on evaporator coil.

b. Weapons Fire. Fire on the ECU with heaviest practical weapons available.

1-8. OTHER DEMOLITION METHODS

a. Scattering and Concealment. Remove all easily accessible parts such as condenser and evaporator fans, fan motor, and control panel. Scatter them through dense foliage, bury in dirt or sand, or throw them in a lake, stream, or body of water.

b. Burning. Pack rags, clothing, or canvas under, around, and inside ECU. Saturate this package with gasoline, oil, or diesel fuel and ignite.

c. Submersion. Totally submerge ECU in a body of water to provide water damage and concealment. Metal parts will be damaged more by salt water than by fresh water.

CHAPTER 2

ECU TECHNICAL CHARACTERISTICS

Section I. INTRODUCTION

2-1. FORMAT. In this manual, each ECU TAMCN is identified on two figure pages; one depicting front and rear views and another depicting dimensional data.

2-2. GENERAL. ECUs identified in this manual control temperature, reduce humidity, and are suitable for use in extreme hot, humid, and cold weather conditions. Appendix B, General Operational and Technical Characteristics, identifies the relative cooling and heating capacities, electrical characteristics, airflow data, and physical data for the individual horizontal and vertical ECU models.

Section II. HORIZONTAL ECUs

2-3. B0001. The B0001, figures 2-1 and 2-2, is a 50/60 Hz, electric, motor-driven, military, compact, base mounted, self-contained, air cooled, horizontal, lightweight ECU, having a **nominal** cooling capacity of 9,000 BTU/HR and a nominal heating capacity of 7,000 BTU/HR. It is designed for mounting through an opening in the shelter. B0001 conforms to MIL-A-52767B, Type II, Size A, Class 3.

2-4. B0002. The B0002, figures 2-3 and 2-4, is a 50/60 Hz, electric, motor-driven, military compact, base mounted, self-contained, air-cooled, horizontal, lightweight ECU, having a nominal cooling capacity of 18,000 BTU/HR and a nominal heating capacity of 14,300 BTU/HR. Newer models are also capable of operating on 400 Hz. It is designed for mounting through an opening in the shelter. B0002 conforms to MIL-A-52767B, Type II, Size B, Class 2.

2-5. B0011. The B0011, figures 2-5 through 2-8 are 60 Hz, electric, motor-driven, horizontal military ECU, having a nominal cooling capacity of 54,000 BTU/HR. The ECU is equipped with a 9.5 kw resistance strip heater offering a nominal heating capacity of 32,400 BTU/HR.

A new concept is incorporated into the B0011 design whereby components are packaged in a ruggedized frame and cabinet to allow military transport without crating. The B0011 is not intended for support of EMI (electromagnetic interference) sensitive equipment. The unit will start and operate in a wide range of environmental conditions at ambient temperatures between 50°F(10°C) and 125°F(52°C). Flexible ducts and the electrical power cable are stored inside the ECU. The horizontal configuration of the B0011 permits stacking and fastening up to four units high for storage and three units high for air transport. B0011 conforms to MIL-A-83216B.

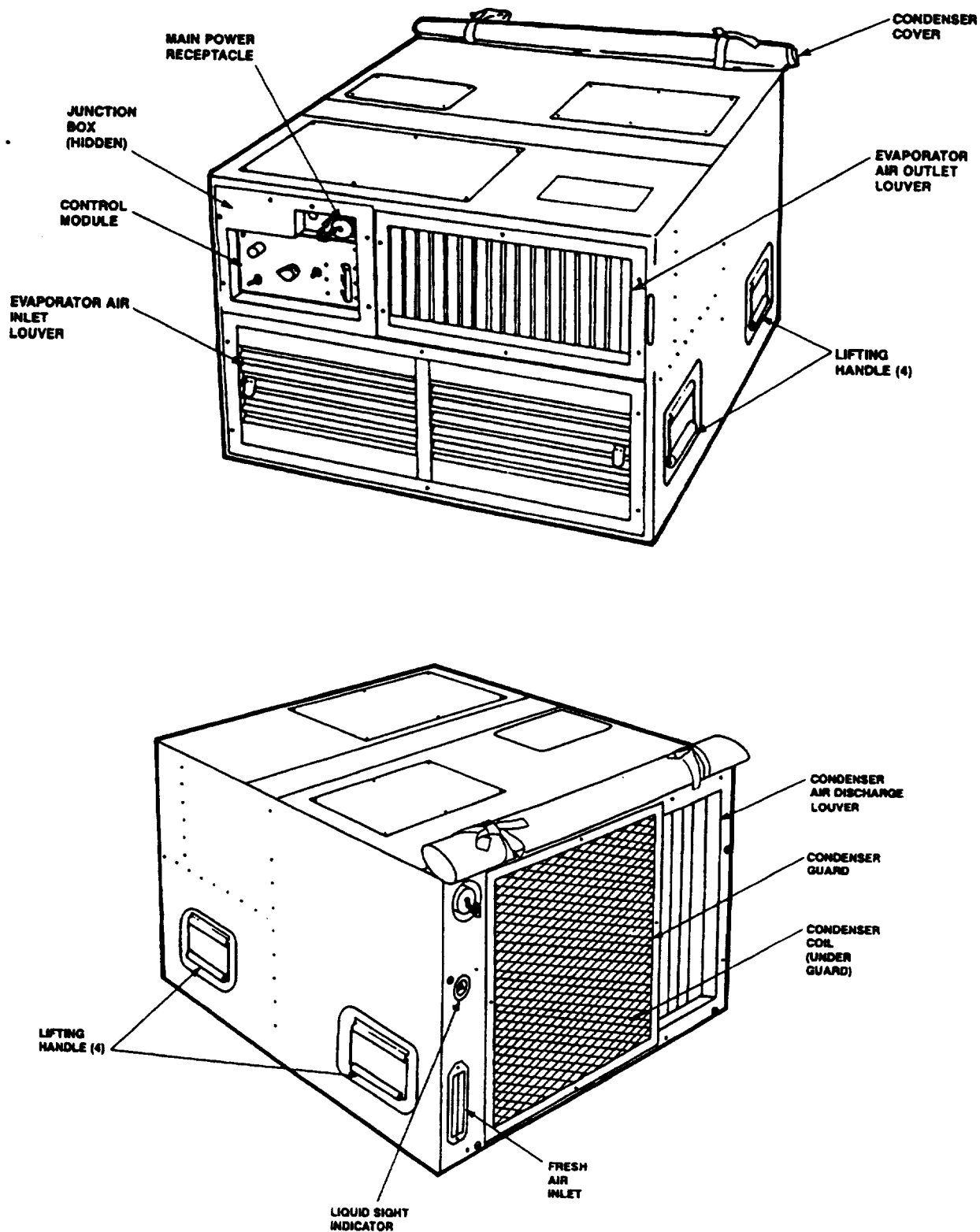


Figure 2-1. B0001, Front and Rear Views

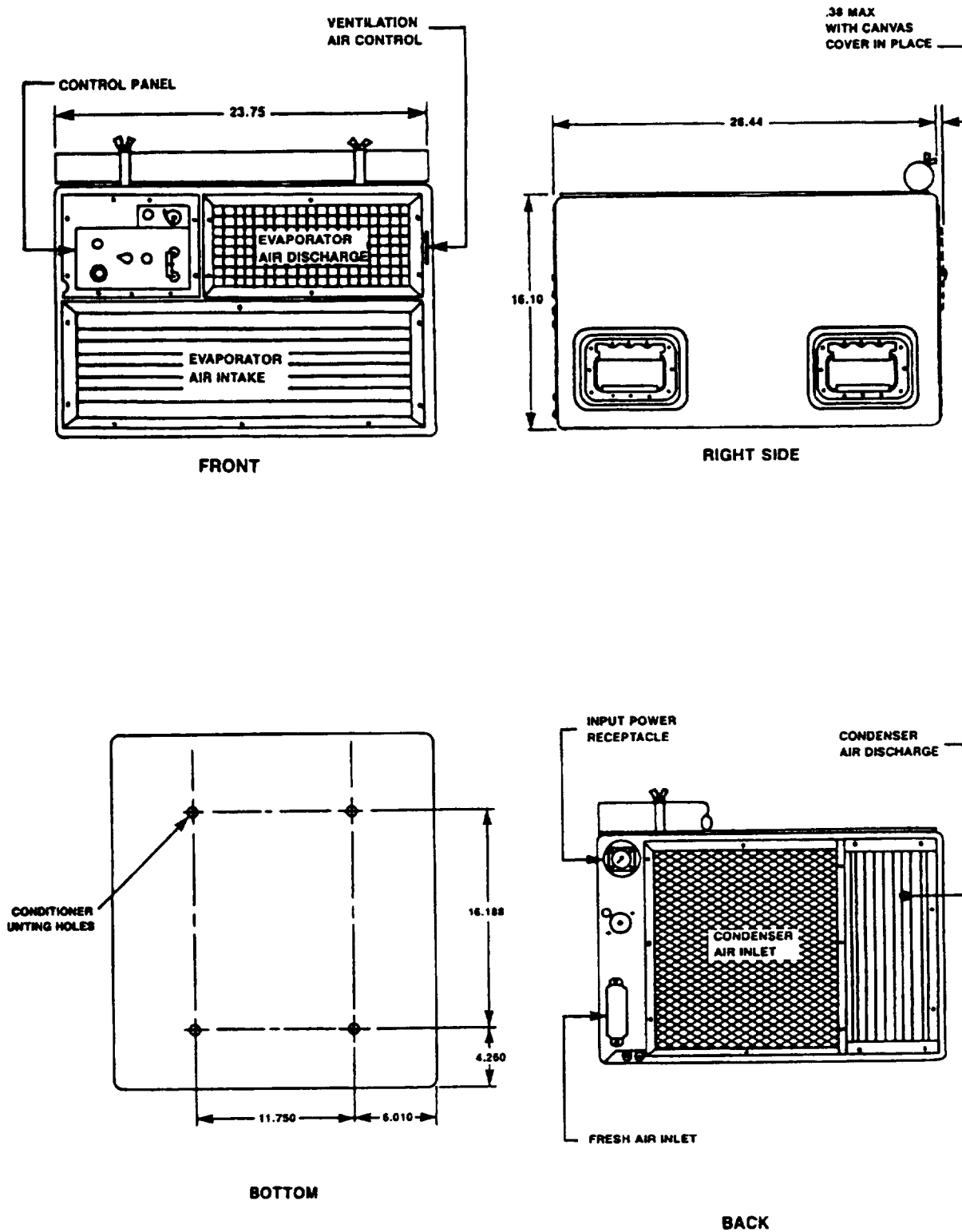


Figure 2-2. Dimensional Data - B0001

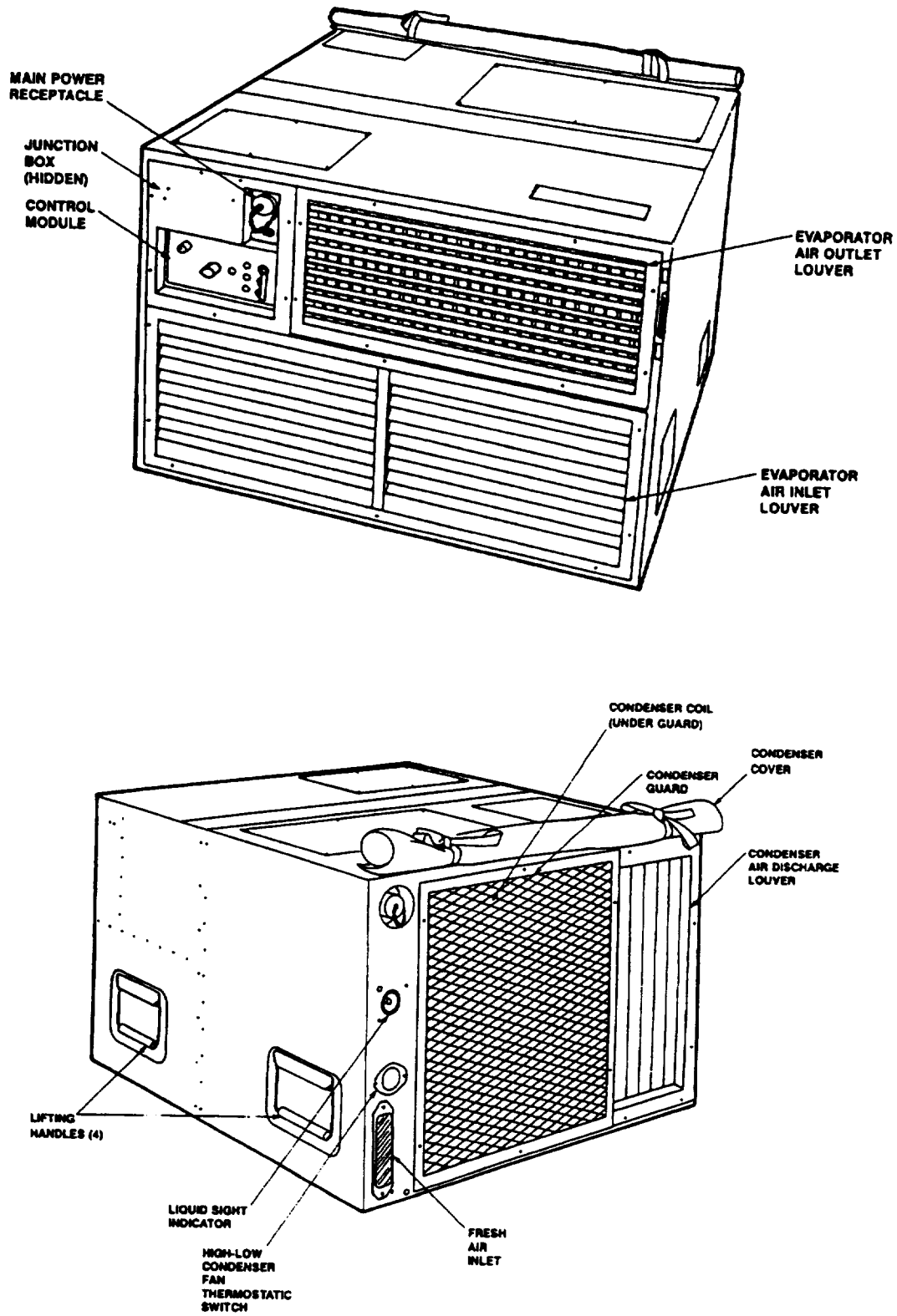


Figure 2-3. B0002, Front and Rear Views

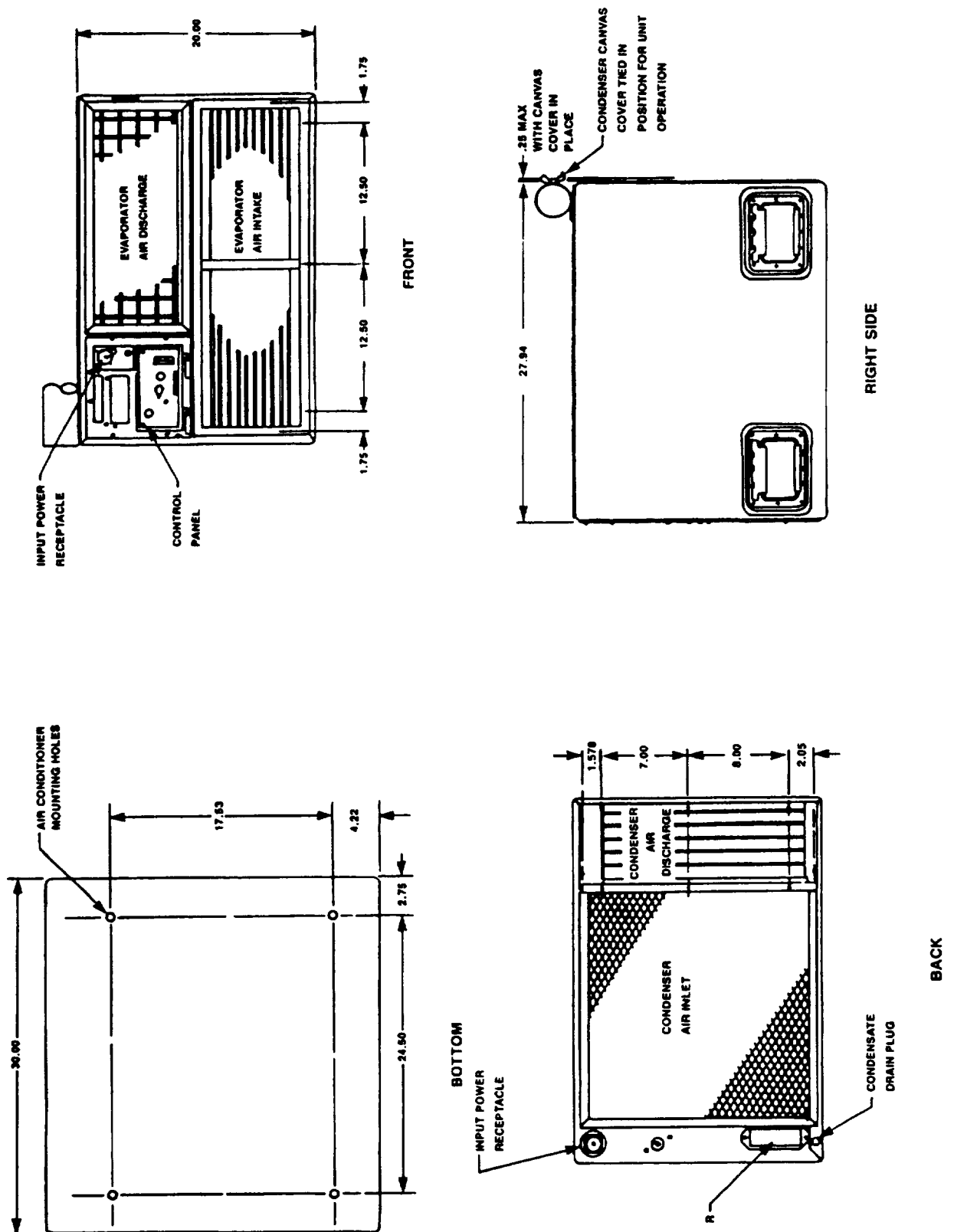


Figure 2-4. Dimensional Data - B0002

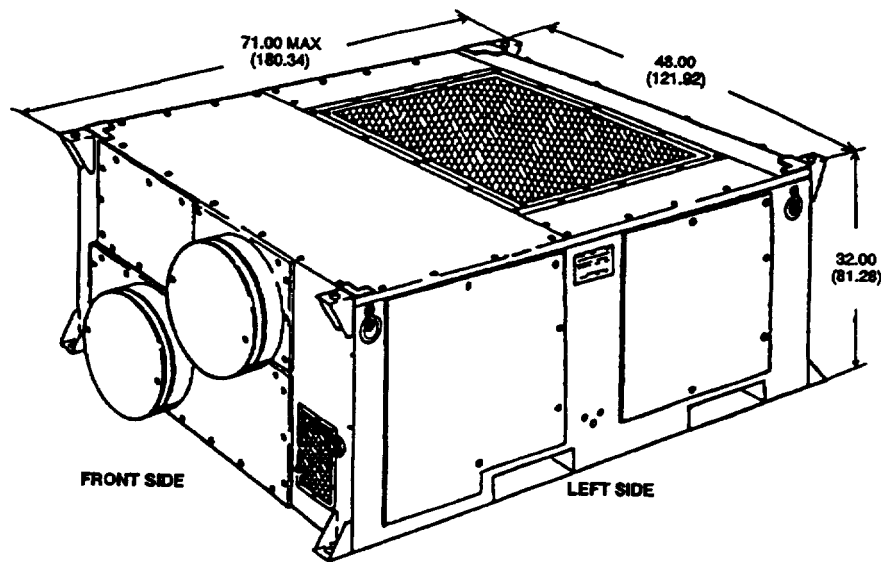


Figure 2-5. Air Conditioner B0011 (12090-601 and 602, Front and Left Side)

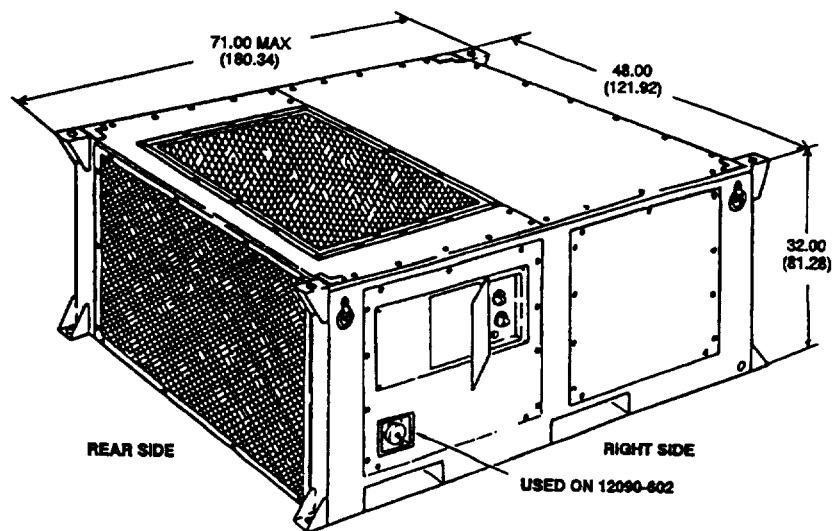


Figure 2-6. Air Conditioner B0011 (12090-601 and 602 Rear and Right Side)

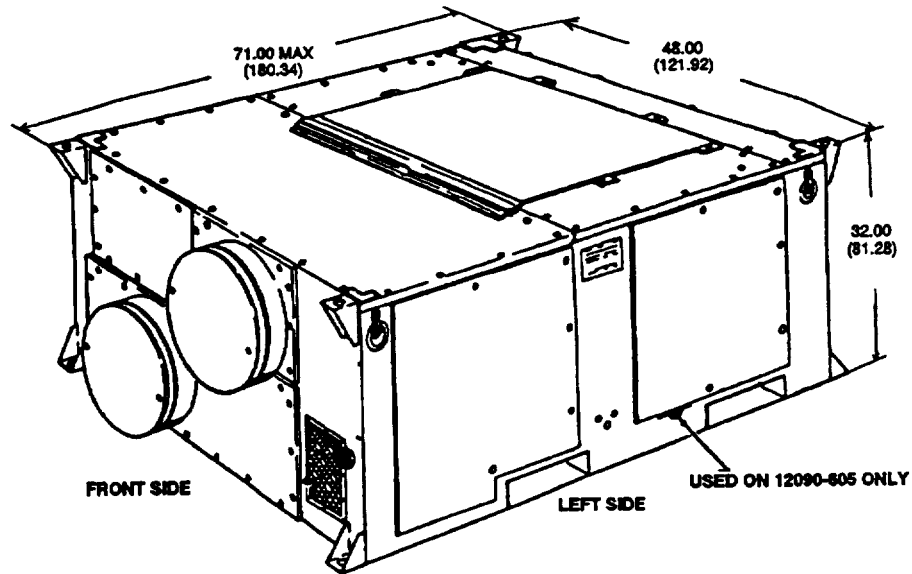


Figure 2-7. Air Conditioner B0011 (12090-603, 604, 605 Front and Left Side)

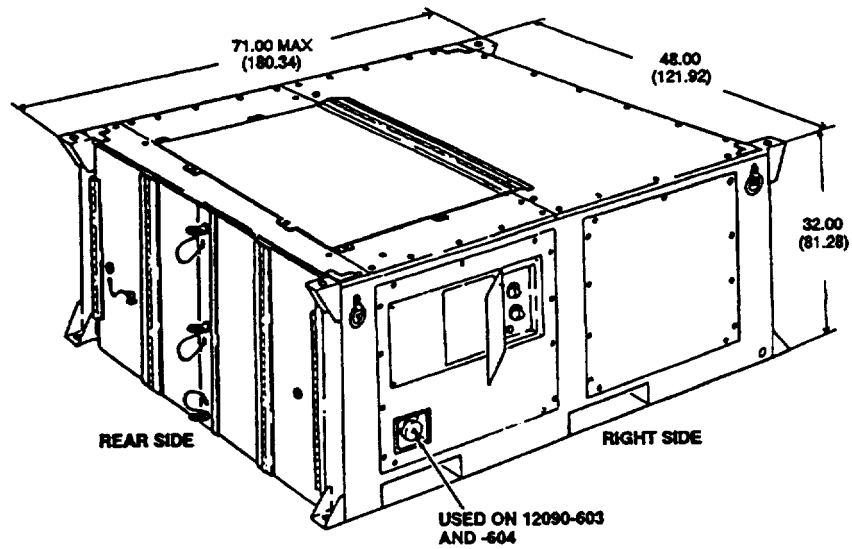


Figure 2-8. Air Conditioner B0011 (12090-603, 604, 605 Rear and Right Side)

Section III. VERTICAL ECUs

2-6. B0003. The B0003, figures 2-9 and 2-10, is a 50/60 Hz, electric, motor-driven military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 18,000 BTU/HR and a nominal heating capacity of 12,000 BTU/HR. It is designed with a removable control panel for remote controlling and has the option of skid mounting for remote installation (Chapter 3). B0003 conforms to MIL-A-52767B, Type I, Size C, Class 1. As the B0003 becomes uneconomical to repair it is being replaced by the B0012.

2-7. B0004. The B0004, figures 2-9 and 2-10, is a 400 Hz, electric, motor-driven, military compact, vertical, lightweight ECU, having a nominal cooling capacity of 18,000 BTU/HR and a nominal heating capacity of 12,000 BTU/HR. It is designed with a removable control panel for remote controlling and has the option of skid mounting for remote installation (Chapter 3). B0004 conforms to MIL-A-52767B, Type I, Size C, Class 2. As the B0004 becomes uneconomical to repair it is being replaced by the B0012.

2-8. B0005. The B0005, figures 2-11 and 2-12, is a 50/60 Hz, electric, motor-driven, military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 36,000 BTU/HR and a nominal heating capacity of 28,600 BTU/HR. It is designed with a removable control panel for remote controlling and has the option of skid mounting for remote installation (Chapter 3). B0005 conforms to MIL-A-52767B, Type I, Size D, Class 1. As the B0005 becomes uneconomical to repair it is being replaced by the B0013.

2-9. B0006. The B0006, figures 2-11 and 2-12, is a 400 Hz, electric, motor-driven, military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 36,000 BTU/HR and a nominal heating capacity of 28,600 BTU/HR. It is designed with a removable control panel for remote controlling and has the option of skid mounting (Chapter 3). B0006 conforms to MIL-A-52767B, Type I, Size D, Class 2. As the B0006 becomes uneconomical to repair it is being replaced by the B0013.

2-10. B0007. The B0007, figures 2-13 and 2-14, is a 60 Hz, electric, motor-driven, military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 60,000 BTU/HR and a nominal heating capacity of 47,000 BTU/HR. It is designed with a removable control panel for remote controlling and may be installed indoors or directly exposed to the atmosphere. B0007 conforms to MIL-A-52767B, Type I, Size E, Class 1.

2-11. B0009. The B0009, figures 2-15 and 2-16, is a 50/60 Hz, single phase, electric, motor-driven, military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 9,000 BTU/HR and a nominal heating capacity of 6,000 BTU/HR. It may be installed indoors or directly exposed to the atmosphere. B0009 conforms to MIL-A-52767B, Type I, Size B, class 3.

2-12. B0012. The B0012, figure 2-17 is a 50/60 or 400 Hz, multi-powered input (MPI), electric, motor-driven, military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 18,000 BTU/HR and a nominal heating capacity of 12,000 BTU/HR. It is designed with a removable control panel for remote controlling and has the option of skid mounting (Chapter 3). B0012 conforms to MIL-A-53089, Type I, Size C.

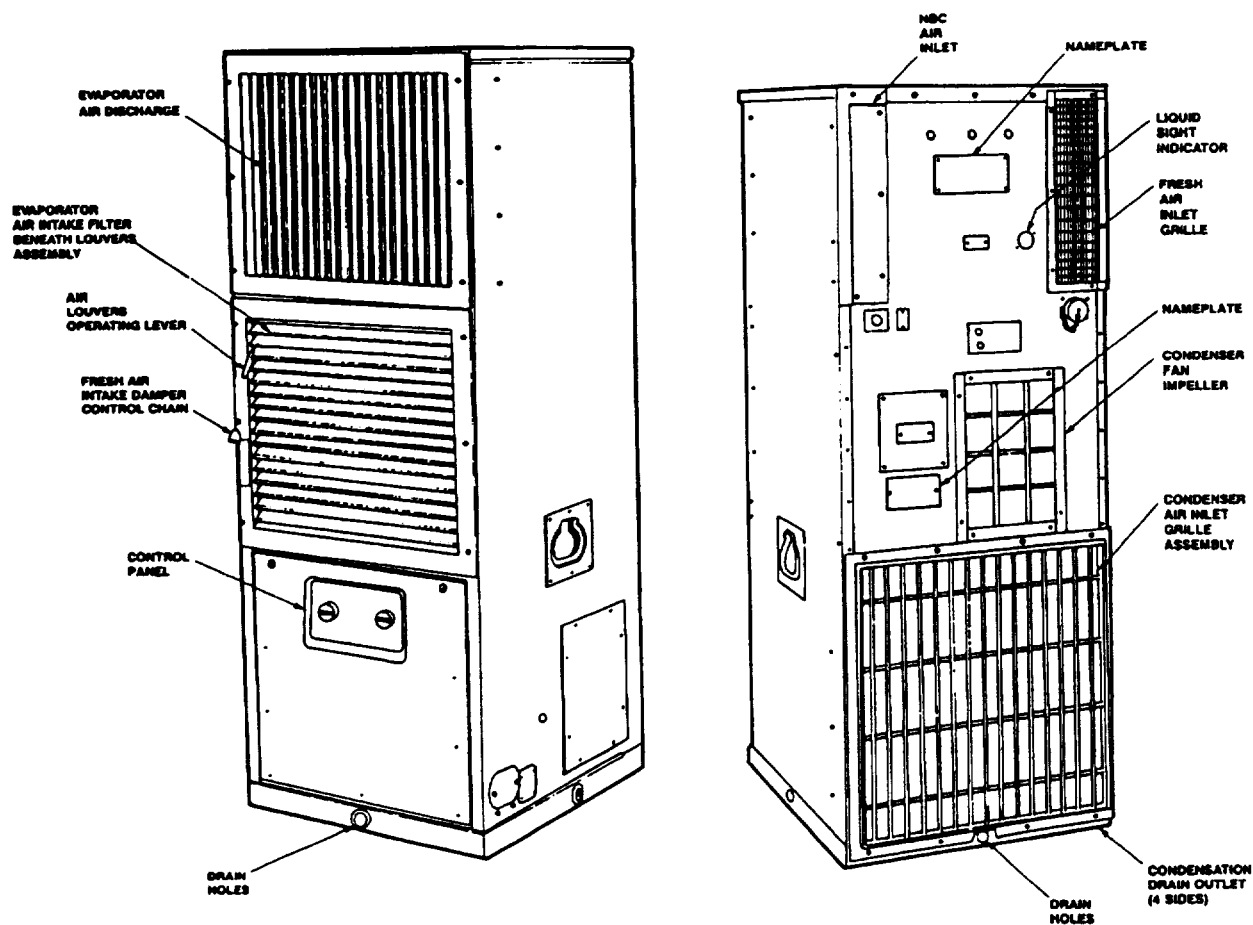


Figure 2-9. B0003 and B0004, Front and Rear Views

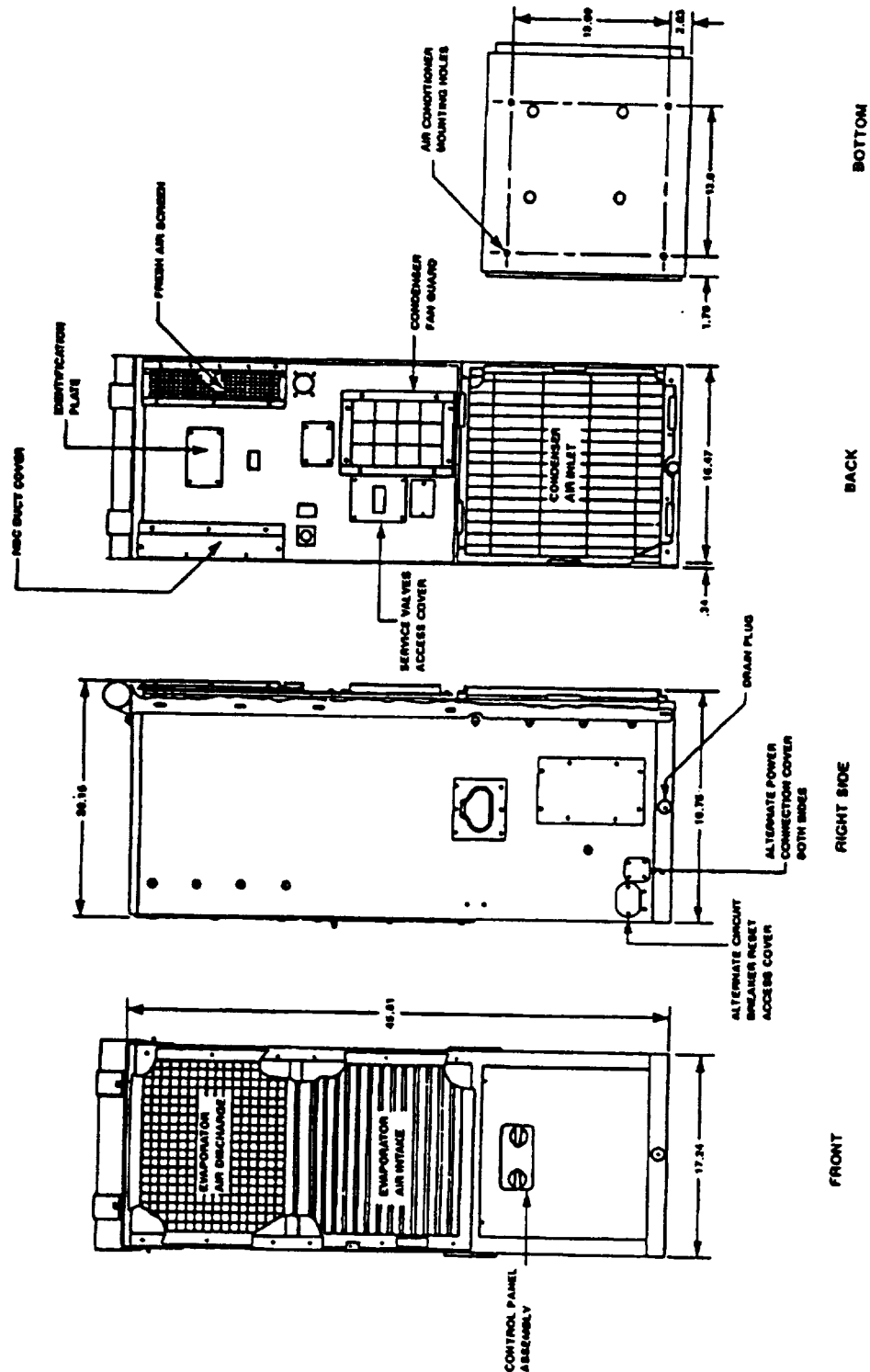


Figure 2-10. Dimensional Data - B0003 and B0004

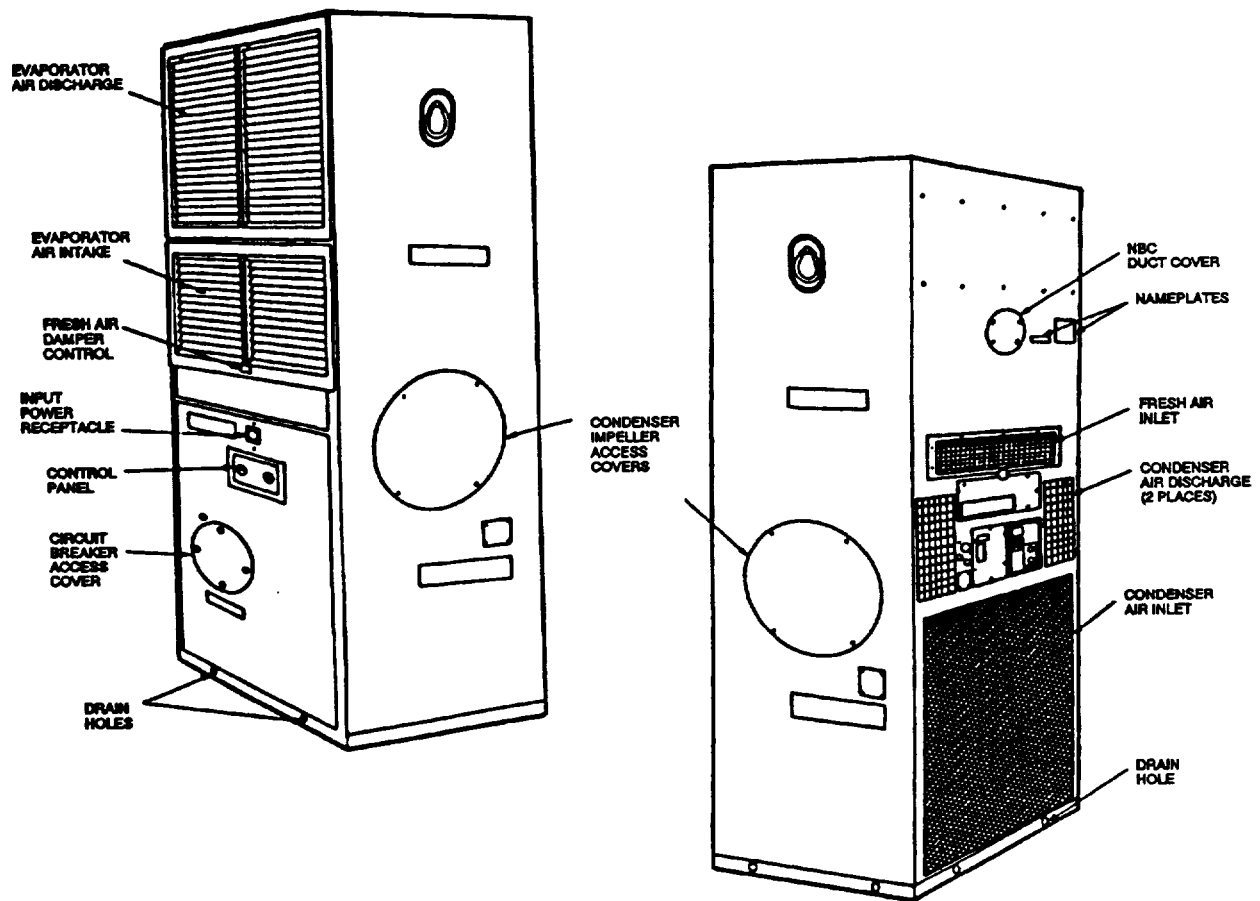


Figure 2-11. B0005 and B0006, Front and Rear Views

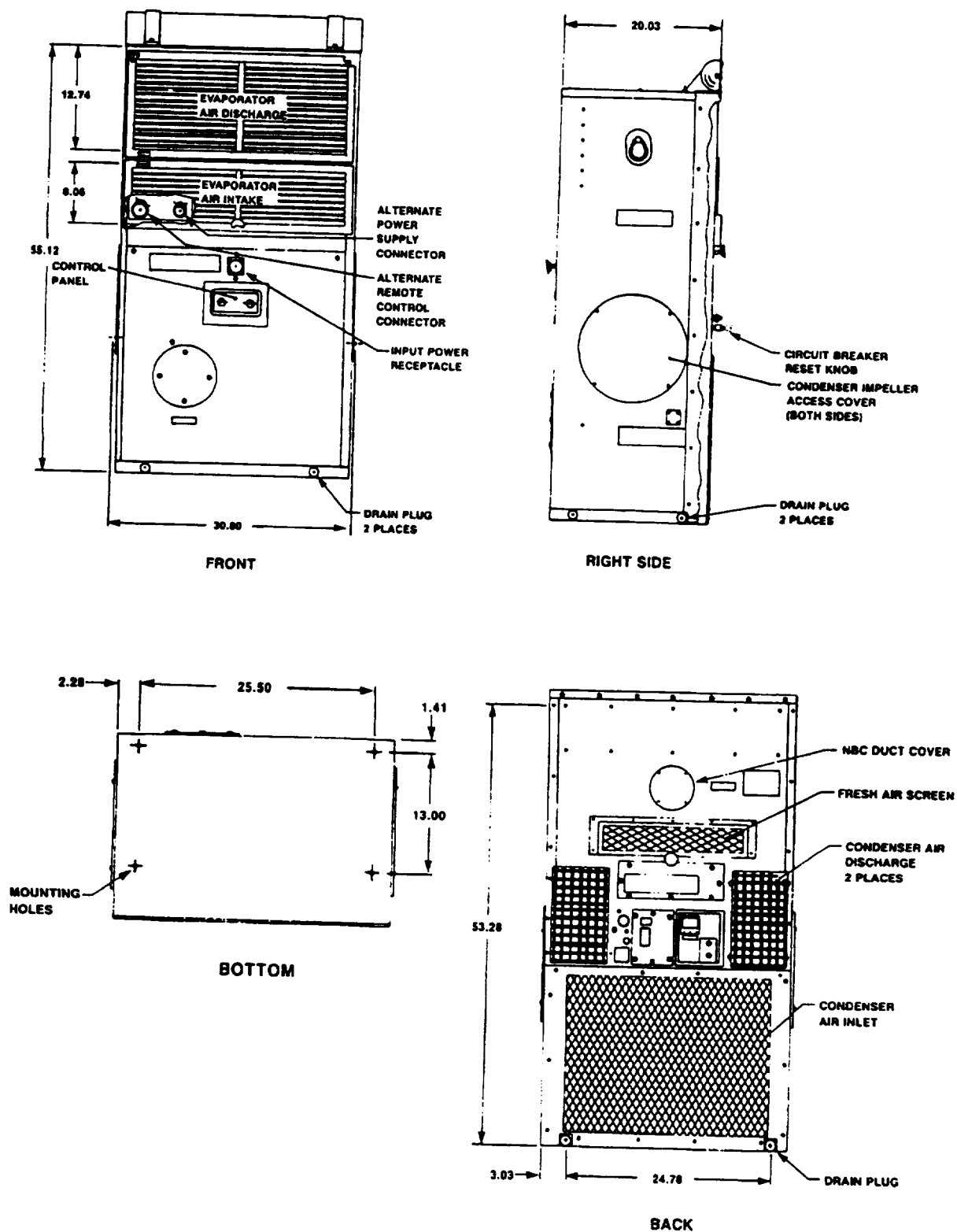


Figure 2-12. Dimensional Data - B0005 and B0006

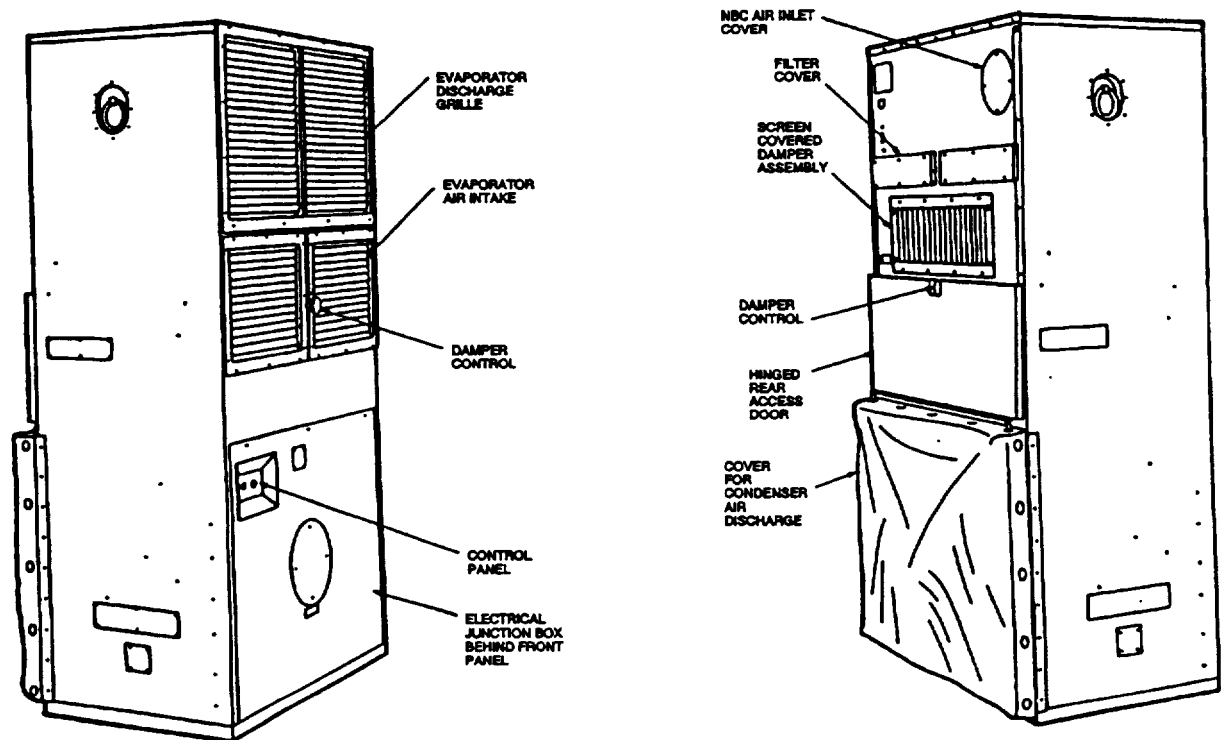


Figure 2-13. B0007, Front and Rear Views

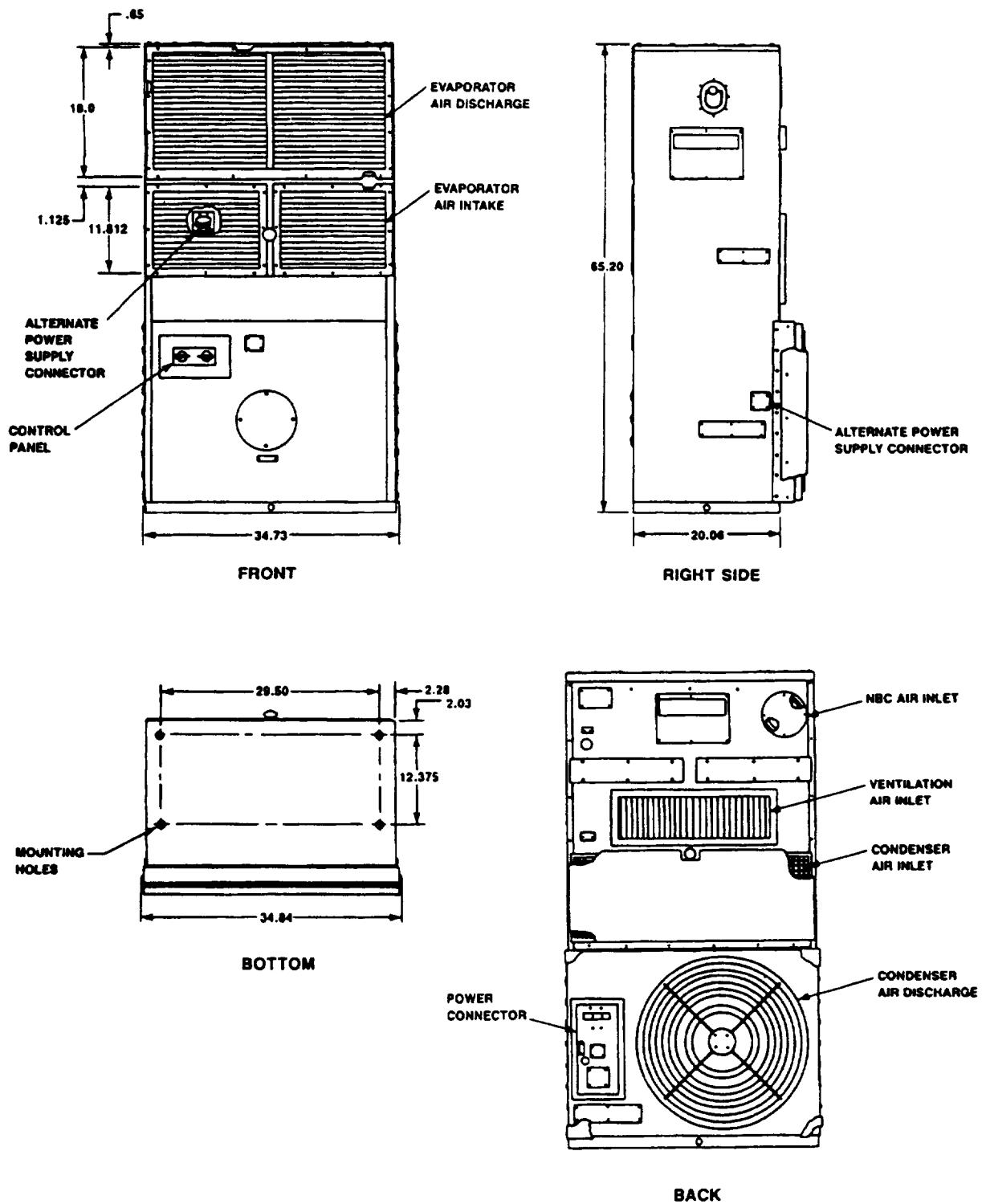


Figure 2-14. Dimensional Data - B0007

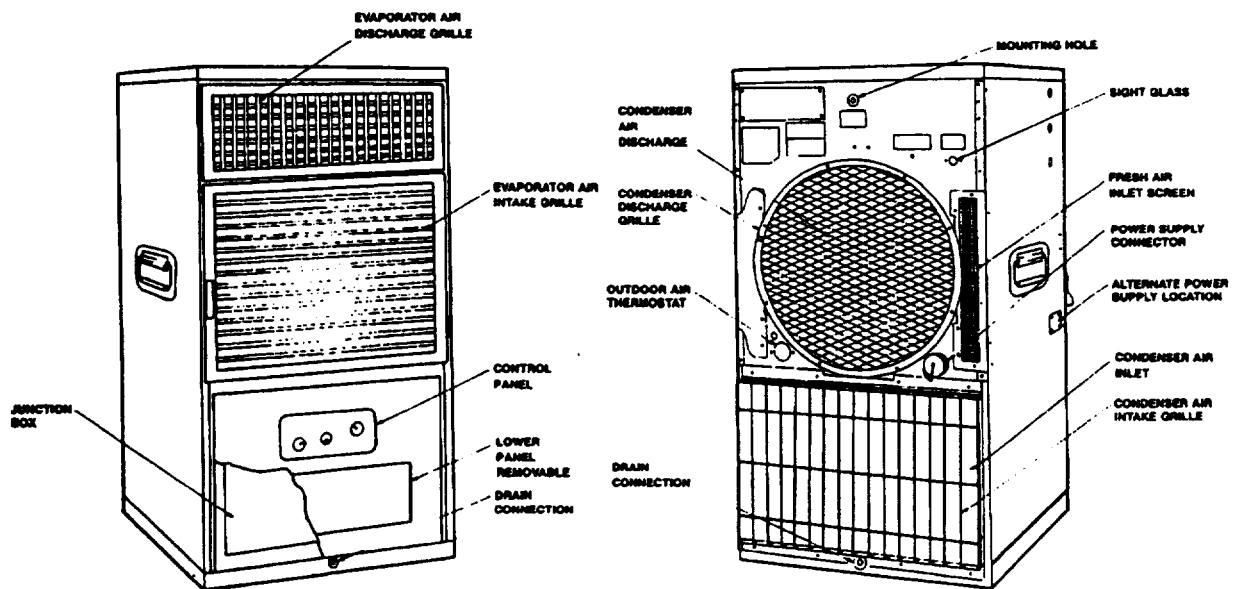


Figure 2-15. B0009, Front and Rear Views

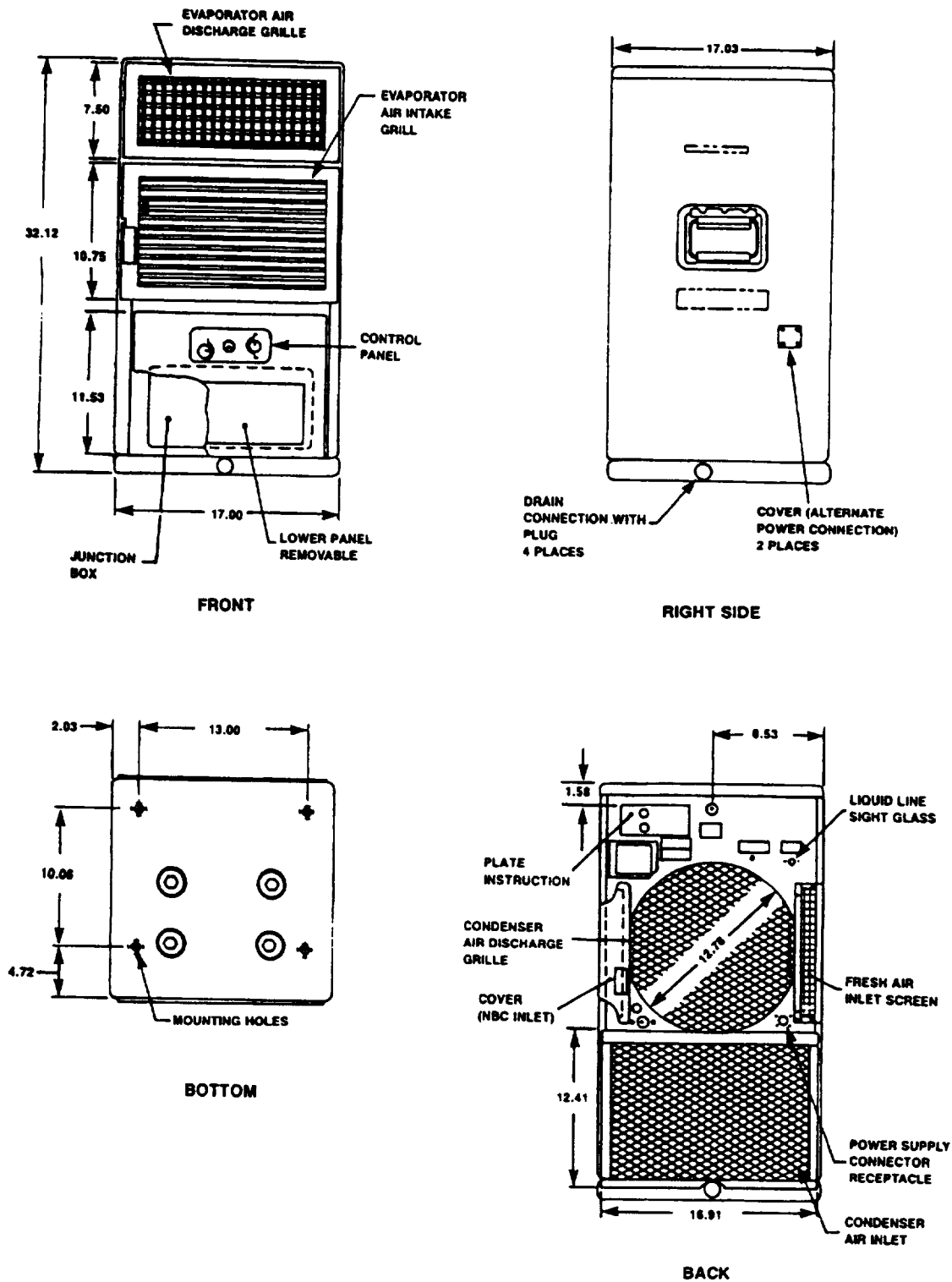


Figure 2-16. Dimensional Data - B0009

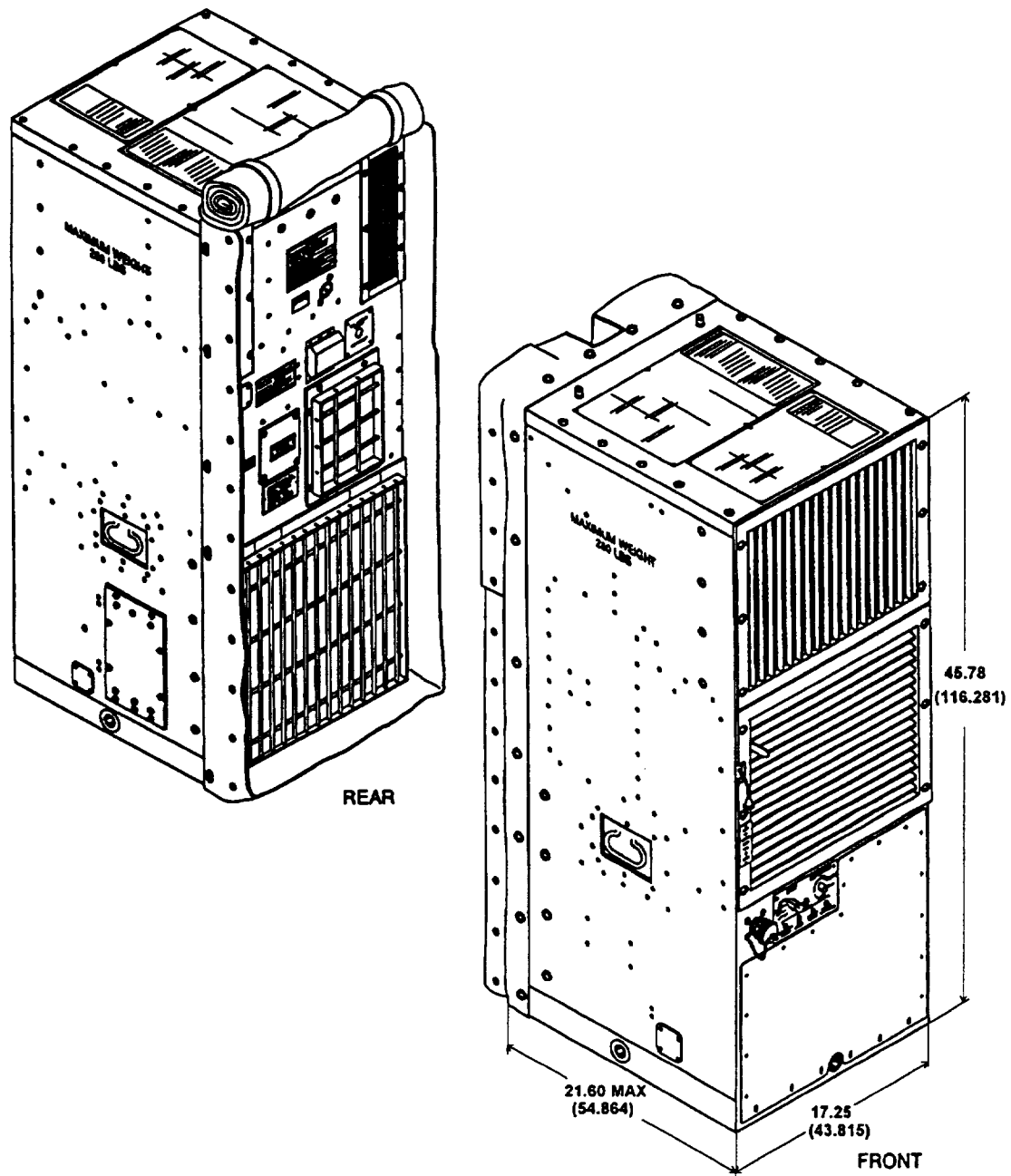


Figure 2-17. B0012, Front and Rear Views with Dimensional Data

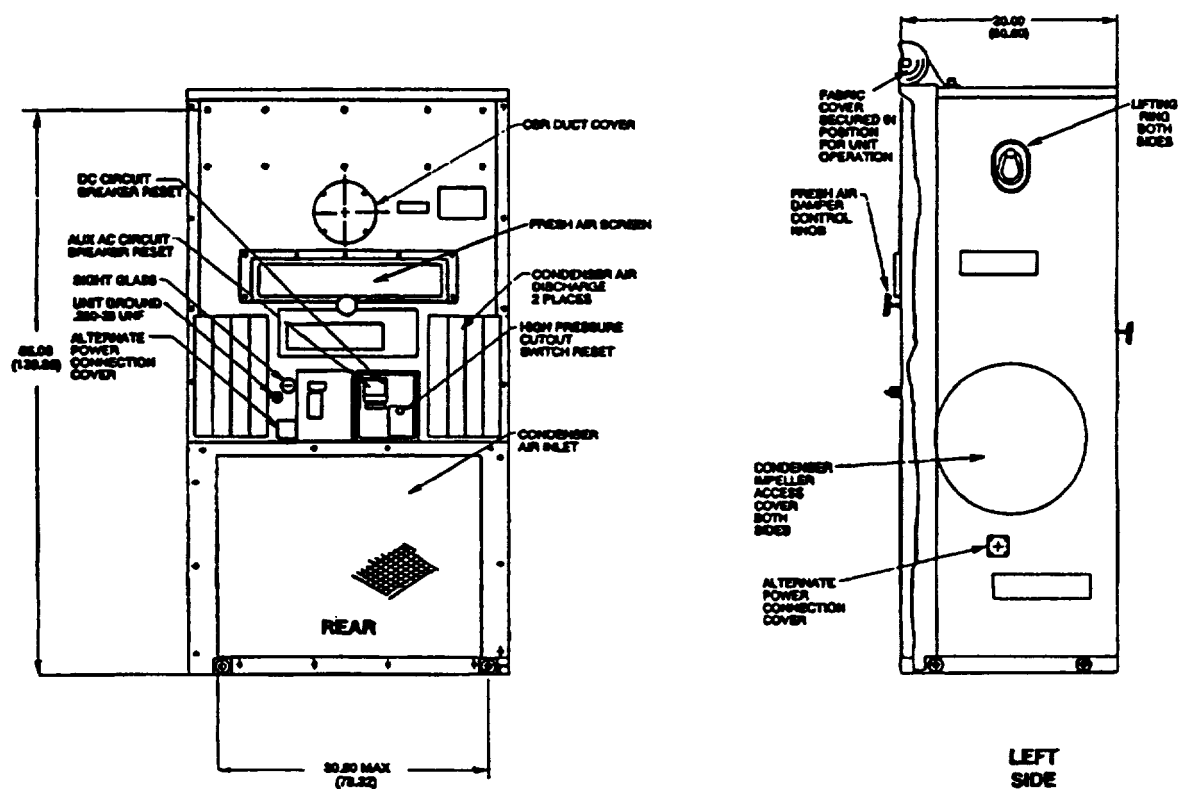


Figure 2-18. B0013 Rear and Left Side with Dimensional Data

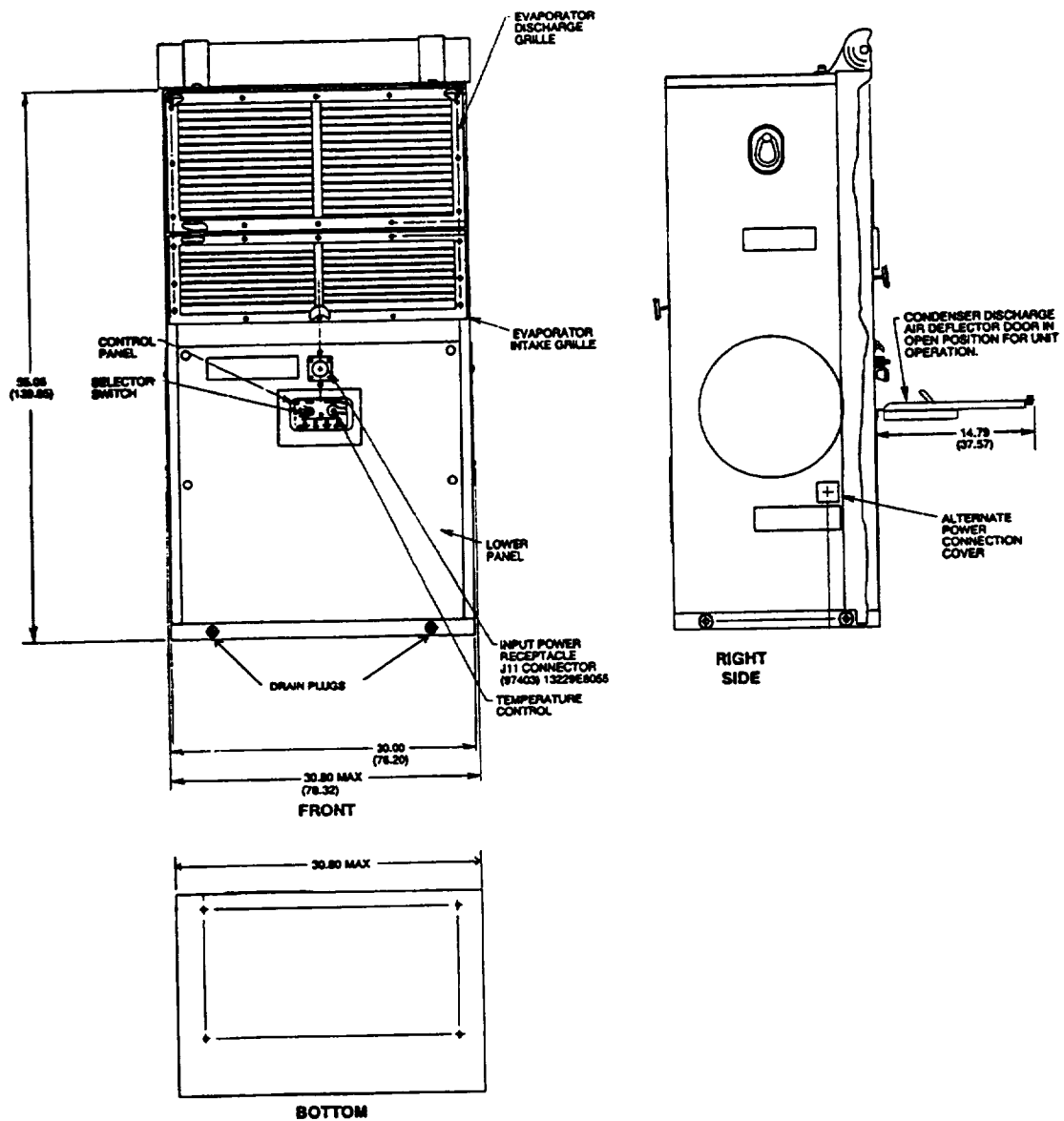


Figure 2-19. B0013Front and Right Side with Dimensional Data

2-13. B0013. The B0013, figures 2-18 and 2-19 are 50/60 or 400Hz, multi-powered input (MPI), electric, motor-driven, military, compact, vertical, lightweight ECU, having a nominal cooling capacity of 36,000 BTU/HR and a nominal heating capacity of 28,600 BTU/HR. It is designed with a removable control panel for remote controlling and has the option of skid mounting (Chapter 3). BOO 13 conforms to MIL-A-53089, Type 1, Size D.

Section IV. ECU APPLICATIONS

2-14. GENERAL. Military ECUs selected for use by the U.S. Marine Corps support a wide range of various FMF applications. Applications range from a simple, bulkhead installation of a horizontal ECU to a complex configuration of a number of individual shelters and various ECUs assembled together to form a system. Applications referred to in this manual denote usage of military ECUs with equipment items located in, or external to, shelters, vans, trailers and compartments.

2-15. SPECIFIC APPLICATIONS. ECU applications are provided in tabular form in table 2-1. Applications are listed by end item TAMCN for each ECU requirement. The following information is included in table 2-1:

- a. End Item TAMCN
- b. Nomenclature of End Item
- c. Model Number
- d. ECU TAMCN
- e. Skid-Mounted/Not Skid-Mounted Determination
- g. ECU Required per TAMCN

Table 2-1. ECU Equipment Requirements
By End Item (TAMCN)

End Item TAMCN	Nomenclature of End Item (EI)	Model Number	ECU TAMCN	Skid- Mounted	ECU Req'd per TAMCN
A0013	Operations Central	AN/TYQ-51	B0003/ B0012	N	8
A0160	Calibration Center, Radiac	AN/GDM-1	B0003/ B0012	Y	2
A0175	Calibration Complex, Transportable	AN/TSM-119	B0011	N	2
A0176	Calibration Facility (CF)	AN/TSM-198	B0005/ B0013	Y	5
A0235	Central Computer Group TAOC	AN/TYA-5	B0004/ B0012	N	2
A0244	Central Office, Telephone Auto, 300 lines	AN/TTC-38(V)1	B0002	N	2
A0246	Central Office, Telephone Auto, 600 lines	AN/TTC-38(V)/2	B0002	N	2
A0248	Central Office, Telephone, Automatic	AN/TTC-42(V)	B0002	N	2
A0258	Communications Central	AN/MSC-63A	B0005/ B0013	Y	1
A0266	Communication Central	AN/MSC-63	B0003/ B0012	Y	1
A0274	Communications Central	AN/TSC-120	B0001	N	1
A0288	Communications System	AN/TSC-95	B0004/ B0012	N	2
A0293	Communication Group	AN/TYA-12	B0004/ B0012	N	2
A0294	Communication Group- TAOC	AN/TYA-16	B0004/ B0012	N	2
A0305	Communications Central	AN/TRC-171	B0005/ B0013	N	1
A0311	Control Central, Communication Technical	AN/TSQ-84	B0001	N	2
A0322	Control Test Maintenance Group	OK-267(V)2TTC	B0001	N	1
A0511	Electronic Shop (DSTV)	AN/MSM-108	B0001	N	2

Table 2-1. ECU Equipment Requirements
By End Item (TAMCN) (Continued)

End Item TAMCN	Nomenclature of End Item (EI)	Model Number	ECU TAMCN	Skid- Mounted	ECU Req'd per TAMCN
A0512	Direct Air Support Central	AN/TSQ-155(V)	B0001	N	3
A0656	Fleet Satellite Communication Central	AN/TSC-96	B0003/ B0012	Y	1
A0656	Fleet Satellite Communication Central	AN/TSC-96	B0005/ B0013	Y	1
A0618	Electronic TMDE Repair Facility	AN/TSC-85B(V)1	B0005/ B0013	Y	2
A0812	Ground Mobile Force Satellite Com Terminal	AN/TSC-85B(V)1	B0001	N	2
A0814	Ground Mobile Force Satellite Com Terminal	AN/TSC-93B(V)1	B0001	N	1
A0845	Intelligence Analysis Center (MAGIS)	AN/TYQ-19(V)	B0011	N	2
A0860	Intercept Facility, Heavy	AN/TSQ-54B	B0003/ B0012	Y	1
A0865	Monitoring Set, Radio Signal	AN/TSQ-103A	B0003/ B0012	Y	1
A0886	Maintenance Transport, Ground	AN/TYA-24	B0004/ B0012	N	1
A0887	Maintenance Facility Group	AN/TYA-28	B0004/ B0012	N	1
A0888	Maintenance Group	AN/TYA-27	B0004/ B0012	N	2
A1111	Operations Central	AN/TSQ-122	B0004/ B0012	Y	4
A1115	Operations Group TACC	AN/TYA-1	B0011	N	2
A1117	Operations Group	AN/TYA-9A	B0004/ B0012	N	2
A1222	Planning Group TACC	AN/TYA-3	B0011	N	2
A1224	Master Station (PLRS)	AN/TSQ-129A	B0002	N	2
A1375	Radar Processor Group (3-0)	AN/TYA-18	B0004/ B0012	N	2

Table 2-1. ECU Equipment Requirements
By End Item (TAMCN) (Continued)

End Item TAMCN	Nomenclature of End Item (EI)	Model Number	ECU TAMCN	Skid- Mounted	ECU Req'd per TAMCN
A1440	Radar Set, Firefinder	AN/TPQ-36(V)5	B0004/ B0012	Y	1
A1500	Radar Set, Lightweight Air Traffic Control	AN/TPS-63B	B0003/ B0012	Y	2
A1503	Radar Set, Lightweight 3D	AN/TPS-59(V)3	B0006/ B0013	Y	6
A1650	Antenna Coupler Group	OE-334/TRC	B0003/ B0012	Y	1
A2179	Radio Terminal, Digital T	AN/TRC-170(V)5	B0003/ B0012	Y	1
A2294	Shelter, Nonexpendable	N/A	B0003/ B0012	Y	1
A2305	Sensor, Monitoring, Central	AN/USQ-66(V)	B0003/ B0012	N	1
A2332	Shelter, Tactical Teletypewriter Equipment Repair	N/A	B0003/ B0012	Y	1
A2335	Shelter, 10 Ft. EMI, Maintenance Complex	82A5049A000	B0003/ B0012	Y	1
A2336	Shelter, 20 Ft. EMI Maintenance	82A5048A000	B0005/ B0013	Y	1
A2337	Shelter, 20 Ft. Rigid, Maintenance Complex	82A5050A000	B0005/ B0013	Y	1
A2338	Shelter, 10 Ft. Rigid,	87A036A000	B0003/ B0012	Y	1
A2393	Signal Monitor Facility, Light	AN/TSQ-88A	B0003/ B0012	Y	1
A2472	Supervisory, Operations Group Alt Tact, Cmd Control	AN/TYA-9B	B0004/ B0012	N	4
A2525	Tactical Air Operations Module (TAOM)	AN/TYQ-23(V)1	B0007	N	3
A2537	Tactical Electronic Recon Processing & Evaluation System	AN/TSQ-90D	B0005/ B0013	Y	4

Table 2-1. ECU Equipment Requirements
By End Item (TAMCN) (Continued)

End Item TAMCN	Nomenclature of End Item (EI)	Model Number	ECU TAMCN	Skid- Mounted	ECU Req'd per TAMCN
A2540	Tactical Data Communication Central	AN/TYQ-3A	B0006/ B0013	N	2
A2550	Tactical Terminal Single	AN/TSC-124	B0003/ B0012	Y	1
A2645	Teletype Central	AN/TGC-46	B0003/ B0012	N	1
A2687	Test Set Intermediate	N/A	B0006/ B0013	N	2
A2695	Test Instrument Repair Facility	AN/GRM-104	B0005/ B0013	Y	2
A3169	Topographic Set	AN/TSQ-204	B0005/ B0013	Y	4
A3243	Test Group	AN/TYA-23	B0004/ B0012	N	1
A3261	Shop Equipment Guided Missile	N/A	B0006/ B0013	N	1
A7500	Test Station, Auto	AN/USM-631	B0011	N	1
B0695	Tactical Petroleum Lab	TPLM-100	B0005/ B0013	Y	1
C5202	Lightweight Reproduction	N/A	B0001	N	2
C5205	Lightweight Reproduction	TI-LRF-1	B0003/ B0012	Y	1
C5872	Reproduction Equipment SE	N/A	B0003/ B0012	Y	8
C5875	Reproduction Equipment SE	TI-RES-5	B0005/ B0013	Y	5
E0145	Bottle Cleaning/Charging Station (BCCS)	AN/TAM-4	B0003/ B0012	N	2
E0697	Improved Platoon Command Post I HAWK	AN/MSW-18	B0004/ B0012	N	1
E1022	Maintenance Facility, Night Sight (NSMF)	AN/TAM-6	B0003/ B0012	Y	1
E1032	Meteorological Data System (MDS)	AN/TMQ-31	B0009	N	2

Table 2-1. ECU Equipment Requirements
By End Item (TAMCN) (Continued)

End Item TAMCN	Nomenclature of End Item (EI)	Model Number	ECU TAMCN	Skid- Mounted	ECU Req'd per TAMCN
E1600	Shop Equipment, GM Remote Control Maint. I HAWK	AN/TSM-179	B0006/ B0013	N	1
E0039	Battery Command Post	AN/MSQ-125	B0006/ B0013	N	2
E1648	Shop Equipment, GM, Remote Control Sys I HAWK Shop 8	AN/TSM-107	B0006/ B0012	N	1
E1650	Shop Equipment Missile Remote	AN/TSM-181(V1)	B0006/ B0012	N	2
E1651	Shop Equipment Missile Remote	AN/TSM-181(V2)	B0006/ B0012	N	2
E1712	Shop Set Maintenance, AR	N/A	B0003/ B0012	Y	1
E1713	Shop Set Maintenance, EL	N/A	B0003/ B0012	Y	1
E1714	Shop Set Maintenance, SM	N/A	B0003/ B0012	Y	1
E3235	Dragon Maintenance Shelter	AN/GSM-216	B0003/ B0012	Y	1
E3236	Van, Maintenance, TOW Weapon System	AN/TSM-161	B0003/ B0012	Y	1

CHAPTER 3 INSTALLATION

Section I. SITE SELECTION

3-1. REMOTING REQUIREMENTS. Unique requirements for some FMF applications necessitate installation of the ECU remote from the shelter. Such an installation requires the use of a skid mount assembly which includes the basic skid, plenum and duct assembly, and shelter attachments. Figure 3-1 depicts a typical remote installation. Refer to paragraph 3-3 or appropriate equipment TM for available modification instructions.

3-2. REMOTE INSTALLATION. Several standard ECUs are designed for remote controlling and have the option of skid-mounting for remote installation. Refer to table 2-1 (pg 2-22) to determine skid-mounting requirements by end item.

a. B0003/B0004 and B0012. TAMCN B2004 (Skid-Mount Model Number SMV18) is available for use with B0003/B0004 and B0012.

b. B0005/B0006 and B0013. TAMCN B2006 (Skid-Mount Model Number SMV36) is available for use with B0005/B0006 and B0013.

3-3. MODIFICATION OF SUPPORTED EQUIPMENT. Replacement of nonstandard ECUs with standard ECUs will, in many cases, require modification of the supported equipment to accept the standard ECU. Use of the skid assembly, attachment of the ECU to the shelter, and components of the retrofit kit are described in the applicable Modification Instructions in table 1-1 (pg 1-1).

Section II. PREPARATION FOR USE

3-4. UNPACKING EQUIPMENT. Move unit to installation site before removing the shipping crate. Remove top, ends, and sides of crate and packing material covering the unit. Remove four screws, washers, and lockwashers that secure the crate base to the unit. Store crate and packing material for use in future moves.

3-5. INSPECTION OF EQUIPMENT. Inspect entire unit for signs of in-transit damage such as broken, cracked, dented, or missing parts. Include the following steps in the inspection:

- a. Check evaporator and condenser coils for damage.
- b. Check intake and discharge grilles and fan grille for bent or broken condition.
- c. Inspect tubing for kinks, broken or cracked tubing or fittings, and cracked or broken joints.
- d. Inspect all exposed wiring for breaks or cuts in insulation and for loose or damaged connections.

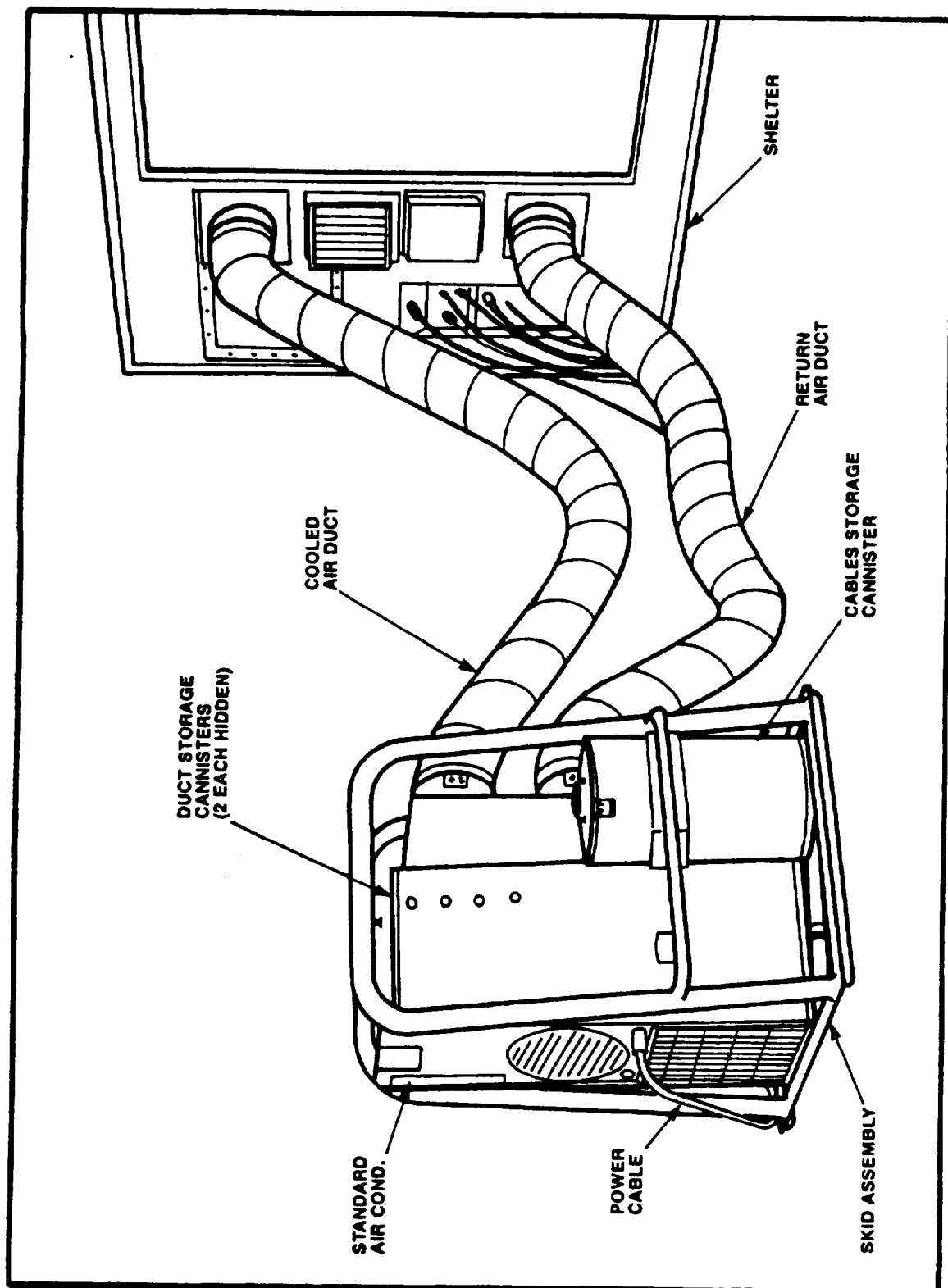


Figure 3-1. Typical Remote Installation

Section III. INSTALLATION PROCEDURES

3-6. LOCATION. Dimensions of each unit are shown in corresponding figures in Chapter 2. Select a location, taking into consideration the following additional space and facility requirements:

- a. Set unit in a reasonably level position to allow proper condensation drainage. operation will be satisfactory, however, with the unit set at a 5-degree slope, using the most accessible drain connection.
- b. The removable lower front panel and the conditioned air supply and return grilles must be accessible for normal service and maintenance.
- c. The condenser air intake grille must be unobstructed to allow sufficient airflow through condenser coil. Both conditioned air supply and return openings at front of unit should be free of obstruction to allow maximum unit capacity.
- d. Refer to Appendix B for power requirements.

3-7. BASE MOUNTING. Bolt base to floor or suitable foundation. Refer to applicable figures listed in Chapter 2 for mounting configurations and bolt hole dimensions. Cage nuts may be removed for through bolting. If unit is mounted on isolators, a 5/16-24 tapped hole at top rear of unit may be used to provide additional support.

3-8. CONDENSATION TUBING. Drain connection holes are located in front, rear, and both sides of base. Remove drain plug from one of the holes and install a drain hose and 3-inch gooseneck trap. Make sure that there are plugs in unused drain holes.

3-9. ELECTRICAL CONNECTIONS. All internal wiring is complete and stored in the shipping unit. The wiring diagram is located on a plate, mounted on the inside of front panel. Connect electrical power supply source to receptacle at rear of unit. Alternate power connections are located on sides of unit. The power connection may be changed to an alternate location by interchanging power receptacle connector and cover plate of alternate location.

3-10. DUCTS. Ducts may be installed from outside to the fresh air inlet at the back of the unit or from an NBC (nuclear, biological, chemical) filter system to a second inlet at the back of the unit. The unit may also be attached to the supply and return air ducts carrying air to and from conditioned space. Flexible connectors are recommended if unit is mounted on isolators. See Appendix B for intake and discharge air opening sizes. Use of the following installation procedures is recommended and applicable to all vertical ECUs:

- a. Remove the grilles from intake and discharge openings on front of unit. Use existing mounting holes for attaching the ducts. Ducts may be reinstalled on ends of corresponding ducts.
- b. If flexible duct connectors are used, do not draw connection tight. Connection should be airtight, but sufficiently loose enough to prevent vibration from being transmitted to the duct. Usually heavy canvas is used for flexible connections. Two or three inches are recommended for this connection.

3-11. CONTROL PANEL LOCATION. The control panel may be removed from unit and installed in a remote location. When the panel is mounted to a remote location, install blockoff on unit in place of control panel to prevent air leakage into unit. An inter-connecting cable with connectors will be required to connect control panel to the unit. The thermostatic switch bulb, located in the return air inlet, must be removed and may be clamped to back of control panel. A clamp is provided with the panel for this purpose.

CHAPTER 4

OPERATING INSTRUCTIONS

Section I. OPERATIONAL CAPABILITIES

4-1. OPERATING CONDITIONS. ECUs will start and operate in the following modes and temperatures:

WARNING

Do not attempt to operate the ECU until the specific technical manual has been reviewed to identify all safety concerns associated with this equipment. Failure to comply may result in damage to equipment or injury to personnel.

- a. Cooling Mode. All ECUs start and operate on cooling mode up to + 120 °F/ECUs entering the evaporator and condenser.
- b. Heating Mode. All ECUs start and operate on heating mode in ambient temperatures from -50°F to + 80°F.

NOTE

In order to preclude undue stress on ECU compressors, thermostats will not be lowered more than 5 degrees of the recommended temperature for supported equipment.

4-2. STORAGE CONDITIONS. Do not store ECUs at ambient temperatures above+ 155°F for more than four hours per day. Do not store ECUs at ambient temperatures below -65°F for more than twelve hours per day, Storage temperatures specifically for B0011 range from -80°F to + 160°F. Conditions assume no solar radiation exposure.

Section II. OPERATING PROCEDURES

4-3. OPERATING PRECAUTIONS. Observe the following precautions at all times:

- a. Keep hands away from fans when unit is operating.
- b. Do not remove any panels to perform work or tests on ECU while ECU is connected to power source.
- c. If motor or compressor becomes overheated, stop unit immediately and check cause.
- d. Should liquid refrigerant come in contact with the skin, injury should be treated as for frostbite or frozen condition. Have medical personnel provide treatment as soon as possible.

4-4. PRELIMINARY PROCEDURES. Follow the preliminary procedures identified below prior to operation of the unit:

- a. For a new installation, be sure unit is securely fastened to mounting surface.
- b. Check to ensure all obstructions to free flow of air are well back from front and rear intake grilles.
- c. Turn selector switch to OFF position.
- d. Apply power to unit.
- e. Test the fan motor by turning selector switch to VENT, COOL and then back to OFF. Observe proper direction of rotation of the condenser fan.

4-5. OPERATION UNDER NORMAL CONDITIONS

- a. Cooling Operation. Set temperature control at desired temperature setting; set selector switch to COOL position, starting the compressor. Allow system to operate until it is discharging cooled air, then raise or lower temperature control to desired temperature setting.
- b. Bypass. With selector switch in COOL position, raise thermostat setting; as set point passes above ambient temperature, unit should go into bypass operation.
- c. Heating Operation. Place selector switch to LO HEAT position. For additional heating capacity, place selector switch to HI HEAT position. Raise or lower temperature control to desired temperature setting.
- d. Positioning of Controls. Adjust temperature control setting, fresh air inlet damper, and selector switch in accordance with the System Operating Information Chart, table 4-1.

NOTE

Center of temperature control scale corresponds to approximately +65°F/ + 18°C.

- e. Shut-Down. To temporarily shut down the system, set selector switch to OFF. To shut down the system for an extended period of time, proceed as follows:

- (1) Turn selector switch to OFF.
- (2) Disconnect power supply.
- (3) Close fresh air inlet damper. Cover fresh air inlet opening.
- (4) Cover condenser air intake and outlet openings.
- (5) Close return air louvers.

Table 4-1. System Operating Information Chart

Type of EC Required	Temperature Control Setting	Indoor Return Air Louvers	Outdoor Air Damper	Selector Switch
Cooling - 100% recirculated air	Desired temperature	Open	Closed	COOL
Cooling with fresh air	Desired temperature	Partially closed ^{1/}	Open	COOL
Cooling with fresh air drawn through NBC filter (outdoor air contaminated)	Desired temperature	Open	Closed	COOL
Heating - 100% recirculated air	Desired temperature	Open	Closed	LO HEAT or HI HEAT
Heating with fresh air	Desired temperature	Partially closed ^{1/}	Open	LO HEAT or HI HEAT
Heating with fresh air drawn through NBC filter (outdoor air contaminated)	Desired temperature	Open	Closed	LO HEAT or HI HEAT
Ventilation - maximum outdoor air	Any	Closed	Open	VENTILATE

^{1/} The closing of the indoor return air louvers causes a greater portion of the total airflow to be drawn from the outside.

4-6. OPERATION IN EXTREME HEAT. ECU is designed to operate under conditions up to a temperature of + 125°F/ +52°C. When unit is operated in temperatures higher than + 125°F/ +52°C, the cooling capacity will be lowered by high surface and ambient temperatures, causing the unit to run more frequently and for longer periods of time. Long periods of operation may cause the compressor or fan motor to overheat and trip the overload switches, causing the motors to stop. To maintain the highest capacity of the unit, clean filter weekly and more often, if necessary. A dirty filter reduces airflow of the air conditioning unit (see paragraph 5-8).

4-7. OPERATION IN DUSTY OR SANDY AREAS

a. Protection. Shield ECU from dust as much as possible. Take advantage of natural barriers which offer protection.

b. Cleaning. Keep ECU as clean as possible. Pay particular attention to the shutters and grilles. Use compressed air, if available, to aid in cleaning (see paragraph 5-9 and 5-10).

c. Air Filter and Coils

(1) Under extremely dusty or sandy conditions, air filter must be serviced more often (see paragraph 5-8).

(2) Condenser coil is subjected to ambient air; therefore, it requires cleaning more often than evaporator coil (see paragraphs 5-9, 5-10, and 5-11).

4-8. OPERATION UNDER RAINY OR HUMID CONDITIONS

a. General. Take special precautions to keep equipment dry. If installed outdoors, cover equipment with a waterproof cover when not in use.

b. Electrical Components. Take all necessary precautions to keep electrical components free of moisture.

4-9. OPERATION IN SALT WATER AREAS

a. Wash exterior of unit with clean, fresh water at frequent intervals. Take care not to damage electrical system with water. Special attention must be given to prevent rust and corrosion.

b. Ensure that all metal surfaces are painted where paint is chipped, worn, cracked, or peeled.

Section III. PREPARATION FOR MOVEMENT

4-10. SHORT MOVE. If desired, unit may be conveyed or lifted with a crane and appropriate slings or with a lift truck. Cover unit to prevent foreign matter from entering operating ports. If unit is to be conveyed by vehicle, provide suitable holddown fasteners to prevent the ECU from shifting.

4-11. LONG DISTANCE MOVE. Cover top of unit with suitable material, folding edges of the material over front, sides, and back for protection. Crate unit, using the original crate. Provide suitable holddown fasteners to prevent the ECU from shifting.

CHAPTER 5

MAINTENANCE INSTRUCTIONS

Section I. INTRODUCTION

5-1. SERVICING NEW EQUIPMENT. The ECU contains a full operating charge of refrigerant and compressor oil. Refer to Chapter 4 for operating instructions.

5-2. TOOLS AND EQUIPMENT. Although no special tools are required for the ECU, it is assumed in this manual that a qualified refrigeration specialist is servicing the unit. The following standard refrigeration tools and equipment are available:

- a. Compound and pressure gauges, manifold and connecting lines
- b. High pressure vacuum pump (70 micron)
- c. Leak detector
- d. Refrigerant charging cylinder
- e. Multimeter
- f. Goggles and gloves
- g. Refrigeration wrenches
- h. Riveter
- i. Refrigerant Recovery Recycling Station

Section II. SCHEDULED MAINTENANCE

Scheduled maintenance requires various observations by the operator on a daily and weekly basis and is not required at any level higher than organizational maintenance. In addition to the daily and weekly inspections, the operator must at all times be alert for any unusual noises or other indications of malfunctions during operation of the ECU. All deficiencies noted should be corrected before further operation of the unit is attempted.

WARNING

Maintenance of the ECU cooling systems requires silver soldering. Proper ventilation must be ensured to prevent harmful gas inhalation. Process requires torch emitting extreme heat. Take all necessary precautions to prevent severe injury to personnel.

WARNING

The ECU operates on very high voltage. Power source must be disconnected prior to performing service or maintenance on the unit. Failure to comply may result in severe injury or death to personnel.

5-3. DAILY INSPECTION. Perform the following scheduled maintenance checks and services on a daily basis:

- a. Inspect all exposed wiring for breaks or cuts in insulation and for loose or damaged connections.
- b. Ensure intake grille louver control operates grille freely prior to operation.
- c. Ensure damper door control chain operates damper freely prior to operation.
- d. Ensure control panel switches operate properly.
- e. Ensure circuit breaker operates the ECU.
- f. Check sight glass for condition of refrigerant. Color indicates moisture content and bubbles indicate low refrigerant.
- g. Check amount of airflow with hand. Amount of airflow can indicate fan operation and cooling or heating operation.

5-1. WEEKLY INSPECTION. Perform the following scheduled maintenance checks and services on a weekly basis:

- a. Check and remove fresh air inlet screen and clean as required.
- b. Check and remove ECU filter and clean as required.
- c. Check and remove condenser screen and clean as required.

5-5. LUBRICATION. The ECUs are permanently lubricated, therefore, no lubrication instructions are necessary.

Section III. OPERATOR MAINTENANCE

5-6. GRILLES. Dust, insects, and other foreign matter will restrict airflow through grilles and screens. Perform the following maintenance procedures for cleaning:

- a. Remove screws, washers, and lockwashers securing the evaporator air intake and discharge grilles to the casing. Remove grilles.
- b. Remove screws, washers, and lockwashers and remove fresh air screen, condenser air intake guard and screen, and condenser fan grille and screen.
- c. Wash grilles and screen thoroughly by flushing in hot water. Allow grilles and screen to dry thoroughly.
- d. After cleaning the evaporator intake or discharge grille, inspect gasket for damage or loose cement.
- e. Install grilles and screens and secure with previously removed screws, flat washers, and lockwashers.

5-7. AIR INTAKE FILTER. The evaporator air intake filter is the permanent type and requires only periodic cleaning. Perform the following procedures for cleaning:

- a. Remove evaporator air intake grille.
- b. Loosen fasteners securing filter retainer to casing and remove retainer.

- c. Pull right side of filter to right and forward to disengage left side of filter from retainer.
- d. Wash filter with hot water or steam. When dry, dip filter in Standard Air Maze Filerkote or suitable substitute.
- e. Install filter in left retainer and install right retainer over end of filter.

5-8. EVAPORATOR COIL. Clean evaporator coil without removing coil from ECU. Perform the following procedures for cleaning:

WARNING

Do not use steam to clean the coils of the ECU. Use of steam may result in damage to equipment or severe injury to personnel.

- a. Remove air discharge grille at top front of unit and top cover panel assembly.
- b. Clean surface of coil and, using compressed air, blow dirt out from between the fins.
- c. Install grille and top cover panel.

5-9. CONDENSER COIL. Clean condenser coil without removing coil from unit. Perform the following procedures for cleaning:

- a. Remove screws, flat washers, and lockwashers that secure the condenser air intake guard and screen to the casing. Remove guard and screen.
- b. Clean surface of coil and, using compressed air, blow dirt out from between the fins. Hold nozzle of air hose at least six to eight inches away from coil to avoid damaging the fins.
- c. Install air intake guard and screen and secure with screws, flat washers, and lockwashers.

5-10. ALTERNATE CONDENSER COIL CLEANING PROCEDURES. If compressed air is not available for cleaning the condenser coil, perform the following cleaning procedures:

- a. Remove airborne fibrous materials before attempting to clean the condenser. Use a nonmetallic, soft-bristled brush to clean away insects, lint, etc.
- b. Using cold or warm water, remove oil-free dirt; wet down condenser surfaces and allow to soak for five minutes. Flush surfaces with cold or warm water and clean with a nonmetallic, soft-bristled brush.

CAUTION

Use of water, especially high pressure hoses may result in damp or wet electrical components. Inspect and dry all electrical components, especially motor controllers prior to placing equipment in service. Failure to comply may result in damage to equipment.

c. Remove oil-contaminated dirt by using a warm solution of water and detergent; wet down condenser surfaces and allow to soak for twenty minutes. Flush surfaces with warm water and clean with a nonmetallic, soft-bristled brush.

5-11. REFRIGERANT SIGHT INDICATOR. Check the liquid sight indicator periodically for indication of moisture or shortage of refrigerant. Report indications of moisture or shortage of refrigerant to higher authority for correction. Moisture content and refrigerant shortage conditions are determined by the following observations:

- a. Moisture in the refrigerant is shown by the indicator turning from green to yellow.
- b. A shortage of refrigerant is indicated by bubbles in the indicator.

5-12. DRAIN TUBING. Clean drain pan and drain tubing to provide adequate drainage of condensate.

Section IV. ORGANIZATIONAL AND INTERMEDIATE MAINTENANCE

CAUTION

Use Environmental Protection Agency (EPA) approved refrigerant recovery/recycling station when servicing the equipment to preclude damage to equipment and the environment.

Organizational and intermediate maintenance normally is limited to the testing, repairs, and replacement of defective parts. Repair and replacement beyond the scope of operator maintenance should be referred to the maintenance echelon having the proper tools, information, and equipment to perform the needed operations. Refer to applicable technical manuals identified in the Marine Corps Stocklist Publications for additional maintenance instructions.

APPENDIX A

REFERENCE MATERIAL INFORMATION

A-1. REFERENCE PUBLICATIONS. Use the Marine Corps Stocklist Publications to identify pertinent publications and essential specific information relating to the use, operation, maintenance, and overhaul of the ECUs described in this manual. These stocklist publications are normally printed on standard size sheets (8½" x 11") and are produced as loose leaf publications for convenience of users. A number of stocklists also appear on microfiche.

a. General. All centrally managed Marine Corps supply items are covered in these indexes or stocklists including support publications, principal end items, major components, assemblies, modification kits, and repair parts. These publication listings provide the following information on supply items.

- (1) National Stock Numbers (NSNs)
- (2) Federal item names
- (3) Federal item descriptions
- (4) Reference part numbers
- (5) Illustrations
- (6) Standard prices
- (7) Unit of issue
- (8) Sources of supply
- (9) Table of Authorized Materiel (TAM) Control Numbers
- (10) Item Designator (ID) numbers
- (11) Stock level guidance data
- (12) Cross-reference lists
- (13) Other related data

b. Specific Stocklists. Stocklists (SLs) are used to disseminate essential information to all levels of supply operations. These stocklists are complete and integrate reference documents for both supply and maintenance operations. Specific instructions for using each type of stocklist are included within each preface. Information contained in these prefaces will vary. Carefully read and study each one, as applicable, for research purposes. The following Marine Corps Publication Indexes are available:

(1) SL-1-2. This stocklist is an Index of Authorized Publications for Equipment Support and is used to determine which publications are required for supply support and maintenance of equipment. The following sections are included in SL-1-2:

- | | |
|--------------------------|--|
| | (a) Item Designator (ID) Conversion Indexes |
| | (b) Part I - Cross-Reference List of Equipment to Item Designator (ID) |
| Numbers | |
| | (c) Part II - Cross-Reference List of Equipment to Authorized |
| Maintenance Publications | |
| | (d) Part III - Index of Superseded or Rescinded Publications |

(2) SL-1-3. This stocklist is an Index of Authorized Marine Corps Publications to be stocked and utilized. Included are publications adopted for Marine Corps use that have been prepared by other Department of Defense activities and commercial contractors. In addition to the standard stocklist contents, the SL-1-3 includes:

- (a) Table of Prefix Control Numbers (PCN)
- (b) Section A - List of Publications by PCN
- (c) Section B - Cross-Reference List of Publications by Short Title
- (d) Section C - List of Superseded or Canceled Publications

(3) SL-3. This stocklist is a Components List which identifies all components and accessories for collection-type supply items, such as major combinations, systems, vehicles, groups, outfits, sets, or assortments.

(4) SL-4. This stocklist is a Repair Parts List (RPL) which identifies items, components, and major assemblies. In addition to the standard stocklist contents, the SL-4 includes:

- (a) Illustrations
- (b) Federal Supply Codes for Manufacturers
- (c) Part I - Item Identification Listing
 - 1 Item Number
 - 2 Model
 - 3 NSN
 - 4 Reference Designator/Figure Key
 - 5 Indenture Code
 - 6 Item Identification
 - 7 Unit of Measure
 - 8 Quantity
 - 9 Source Maintenance Recoverability (SMR) Code
 - 10 Special Stockage Indicator
 - 11 Replacement Factor
- (d) Part II - Item Number Cross-Reference
- (e) Part III - NSN Cross-Reference
- (f) Part IV - Part Number Cross-Reference
- (g) Part V - Minimum Stockage List

(5) SL-6-1. This stocklist is an Applications List for End Items and Components and is a computer printout (microfiche) cross-reference of all centrally managed end items, major components, modification kits, and secondary depot repairable items assigned ID numbers. In addition to the standard stocklist contents, the SL-6-1 includes:

- (a) Table I - Item Designator (ID) Numbers - Current
- (b) Table II - NSN
- (c) Table III - Item Name
- (d) Table IV - Model or Type Number
- (e) Table V - Table of Authorized Materiel Control Number

A-2. ACRONYMS. The following is a complete list of applicable acronyms and their definitions as used in this manual.

A/c	- air conditioner
BTU	- British Thermal Unit
C	- Celsius
cfm	- cubic feet per minute
EI	- end item
EMI	- electromagnetic interference
EC	- environmental control
ECU	- Environmental Control Unit
F	- Fahrenheit
FMF	- Fleet Marine Force
Hz	- hertz (cycles per second)
H ₂ O	- water
ID	-item designator
kw	- kilowatt
MTTR	- mean time to repair
MPI	- Multi-Powered Input
N/A	- not applicable
NBC	- nuclear, biological, chemical
NSN	- National Stock Number
PCN	- prefix control number
ph	- phase
RPL	- repair parts list
scfm	- standard cubic feet per minute
SL	- stocklist
TAM	- Table of Authorized Materiel
TAMCN	- Table of Authorized Materiel Control Number
T/E	- Table of Equipment
v	- volt
wg	- water gauge

A-3. ALLOCATION. U.S. Marine Corps military standard ECUs are allocated to FMF (Fleet Marine Force) units. Allocations of ECUs are determined in accordance with the mission of the unit and equipment to be supported.

APPENDIX B

General Operational and Technical Characteristics

TAMCN	BTU/HR		v	Electrical Characteristics			Airflow	
	Cool ^{1/}	Heat ^{2/}		Hz	ph	kw ^{3/}	Ducts	scfm@ 0"wg
B0001	9,000	7,000	208	50/60	3	3.0	None	370
B0002	18,000	14,000	208	50/60	3	6.5	None	590 ^{4/}
B0003 ^{5/}	18,000	12,000	208	50/60	3	5.0	8"	585
B0004 ^{5/}	18,000	12,000	208	400	3	5.7	8"	615
B0005 ^{5/}	36,000	28,600	208	50/60	3	9.6	12"	1,240
B0006 ^{5/}	36,000	28,600	208	400	3	11.0	12"	1,360
B0007	60,000	47,000	208	50/60	3	18.5	16"	1,200
B0009	9,000	6,000	115	50/60	1	3.6	8"	335
B0011	54,000 ^{5/}	32,400	208	60	3	10.0	16"	2,000
B0012	18,000	12,000	208	50/60 or 400	3	5.7	8"	590
B0013	36,000	28,600	208	50/60 or 400	3	11.24	12"	1,163

^{1/} At 120°F(48°C) ambient temperature and 90°F(32°C) dry bulb/75°F(24°C) wet bulb return to evaporator

^{2/} Minimum heating capacity

^{3/} Maximum power consumption

^{4/} Value at 0.25" water pressure

^{5/} At 115°F(46°C) ambient temperature and 85°F(29°C) dry bulb/70°F(21°C) wet bulb to evaporator

^{6/} When equipment becomes uneconomical to repair items will be replaced by the B0012/B0013

Physical Characteristics

Physical Data			
TAMCN	Wt lb	Dimensions W x D x H	Cubic ft
B0001	185	24.00 x 26.50 x 16.00	5.9
B0002	290	30.00 x 28.19 x 20.00	9.8
B0003	276	17.25 x 20.00 x 46.50	8.8
B0004	280	16.81 x 19.75 x 45.81	8.8
B0005	440	30.75 x 21.50 x 55.25	21.1
B0006	450	30.75 x 21.50 x 55.36	21.1
B0007	600	34.75 x 23.50 x 65.20	31.5
B0009	200	17.00 x 17.00 x 32.00	5.4
B0011	940	48.00 x 71.00 x 32.00	59.6
B0012	265	17.25 x 21.60 x 45.78	8.8
B0013	480	30.75 x 21.50 x 55.25	21.1

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